



OECD Green Growth Studies

Towards Green Growth in Southeast Asia



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Foreword

Southeast Asia is at a crossroads. The region has enjoyed strong economic growth, but – as elsewhere in the world – this growth model has relied on unsustainable natural resource exploitation, resulting in environmental degradation. The region’s leaders face a choice: continue to pursue a short-sighted, grow-now-clean-up-later model that has proven disastrous, or adopt a far-sighted green growth strategy that can sustain long-term growth without hampering the wellbeing of future generations.

This report argues that green growth is the way to go for Southeast Asia: it will be more beneficial and less costly, while at the same time it will help lay the foundation for stronger, cleaner and fairer economies and societies. The experience of many OECD and other emerging countries shows that growth strategies that ignore environmental performance eventually result in expensive clean-up and mitigation measures, as well as large welfare losses. The report highlights that Southeast Asia has a golden opportunity to leapfrog over the low-performing, polluting, resource-inefficient technologies of more developed countries, given that large swathes of the region’s infrastructure and industrial models are still being developed. Moreover, it points out that the structural changes necessary to achieve long-term economic growth, reduce poverty, protect the environment and attain high levels of well-being will require tying environmental performance to economic growth.

Carried out in consultation with officials and researchers from across the region, *Towards Green Growth in Southeast Asia* provides a framework for regional leaders to design their own solutions to move their countries towards green growth. While recognising the pressures that Southeast Asian economies face to increase growth, fight poverty and enhance well-being, the report acknowledges the links between all these dimensions. It underscores the window of opportunity that the region has now to sustain its wealth of natural resources, lock-in resource-efficient and resilient infrastructure, attract investment, and create employment in the increasingly dynamic and competitive sectors of green technology and renewable energy.

Some key policy recommendations are that these challenges can be met by scaling up existing attempts to strengthen governance and reform countries’ economic structure; by mainstreaming green growth into national development plans and government processes; by accounting for the essential ecosystem services provided by natural capital and ending mindless natural-resource exploitation; and by guiding the sustainable growth of cities to ensure well-being and prosperity.

The OECD has strengthened its engagement with Southeast Asia in recent years, as a strategic priority. We recently launched a Southeast Asia Regional Programme in order to articulate better this collaboration and support domestic priorities, policy reform and regional integration. The Programme aims to foster the exchange of good practices and mutual learning among policy makers. *Towards Green Growth in Southeast Asia* offers good illustrations of how this co-operation can be advanced. The OECD will work towards

mainstreaming the report's recommendations in areas such as governance, investment, and public-private partnerships for infrastructure.

Setting Southeast Asian economies on a green growth path will require policy and institutional reforms, but most of all it will require leadership. The OECD stands ready to support the region in seizing the opportunities that green growth offers to advance sustainable, inclusive development.



Angel Gurría
OECD Secretary-General

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Table of contents

Acronyms	11
Executive summary	13
Chapter 1. The case for green growth in Southeast Asia	17
1.1. Recent macroeconomic performance has been strong	19
1.2. Environmental challenges threaten long-term growth and human well-being	21
1.3. Green growth is necessary for sustained economic growth and improved well-being	28
1.4. The right framework conditions will ease the way towards green growth	31
1.5. A set of green growth indicators can help formulate policies and track progress	49
1.6. Conclusion: Economic growth does not have to mean environmental degradation	53
Notes	54
<i>Annex 1.A1. Domestic material consumption in Southeast Asia</i>	56
Bibliography	61
Chapter 2. Mainstreaming green growth into national development planning	65
2.1. Green growth strategies should be established and integrated into national development plans ..	66
2.2. Green growth is increasingly integrated into ASEAN national development plans	70
2.3. Inter-ministerial co-ordination for green growth is improving	82
2.4. Conclusion: Co-ordinated and coherent action is urgent	86
Notes	87
Bibliography	88
Chapter 3. Founding green growth on sustainable resource use	93
3.1. Development in Southeast Asia is leading to natural capital depletion	94
3.2. Sustainably managed forests are an important source of green growth	100
3.3. Sustainable fisheries support livelihoods, food security and biodiversity	111
3.4. Green energy can sustain the region's growth	117
3.5. Extractive industries can become more sustainable and contribute to green growth	127
3.6. Sustainable resource management requires good data	132
Notes	135
<i>Annex 3.A1. Mineral, oil and gas resources in ASEAN countries</i>	137
Note	139
Bibliography	139
Chapter 4. National policy options for managing the impact of urbanisation on green growth ..	147
4.1. Most Southeast Asian countries are urbanising rapidly	148
4.2. The costs of unsustainable urban development are high	151
4.3. National policies can guide urban development towards green growth	162
4.4. Conclusion: Now is the time to lock in sustainable urban development	178
Notes	178
Bibliography	179

Figures

Figure 1.1	ASEAN countries have experienced fast GDP growth	19
Figure 1.2	Natural capital contributes a large share of the region's total wealth	21
Figure 1.3	Air pollution is generally high in ASEAN countries.	22
Figure 1.4	High levels of fertiliser consumption and organic water pollution	23
Figure 1.5	Urban waste production is on the increase.	24
Figure 1.6	Climate change could have a large impact on GDP in Southeast Asia in 2060.	25
Figure 1.7	ASEAN countries' small but growing share in global CO ₂ emissions	26
Figure 1.8	CO ₂ emissions are higher per unit of GDP produced than per capita	26
Figure 1.9	Reducing energy intensity is a priority for Southeast Asian countries	27
Figure 1.10	CO ₂ intensity of electricity production could be reduced	28
Figure 1.11	Tax revenue-to-GDP ratios are low in Southeast Asia.	39
Figure 1.12	Tax effort varies in Southeast Asia, China and India	40
Figure 1.13	ASEAN R&D spending could be higher	41
Figure 1.14	The density of start-up businesses could be increased	43
Figure 1.15	Public spending on education is generally low in ASEAN countries	45
Figure 1.16	Tertiary education enrolment rates could be improved	46
Figure 1.17	High pupil-to-teacher ratios in some ASEAN countries	47
Figure 1.18	The financial sector and stock markets can be deepened further	49
Figure 1.A1.1	Domestic material consumption in Southeast Asia	56
Figure 2.1	An agenda for national action on green growth in developing countries	66
Figure 3.1	Natural capital contributes greatly to the total wealth of Southeast Asia countries	95
Figure 3.2	Growth is only weakly sustainable for most countries	96
Figure 3.3	In some ASEAN countries natural capital is being depleted at increasing rates	97
Figure 3.4	Biodiversity is under threat in ASEAN countries	99
Figure 3.5	Forests create significant wealth in Southeast Asia.	100
Figure 3.6	The share of forest area is decreasing in most ASEAN countries.	101
Figure 3.7	Although increasing, afforestation does not compensate for natural forest loss	101
Figure 3.8	Agricultural land is expanding.	102
Figure 3.9	Bilateral development co-operation targeting the forestry sector varies across ASEAN countries.	110
Figure 3.10	Fisheries production is significant in Southeast Asia	111
Figure 3.11	Aquaculture in Southeast Asia is a large and fast-growing sector	115
Figure 3.12	Countries vary in their reliance on renewable energy	118
Figure 3.13	Renewable energy sources vary across the region.	118
Figure 3.14	The share of renewables has fallen in most ASEAN countries	119
Figure 3.15	Foreign equity restrictions in electricity generation	123
Figure 3.16	Mismatches between natural resource use and accumulation of physical and human capital	131
Figure 4.1	All Southeast Asian countries are urbanising, but at different rates	149
Figure 4.2	Share of urban population by city size in Southeast Asia	149
Figure 4.3	Number of cities classified by city size	150
Figure 4.4	Urban expansion in Southeast Asian cities tends to outpace population growth	152
Figure 4.5	Air pollution levels exceed WHO standards in most cities	153
Figure 4.6	Pollution levels in the region's largest cities.	154
Figure 4.7	Air pollution costs are high in the region.	155
Figure 4.8	Car ownership is rising in Southeast Asia	156
Figure 4.9	Car ownership is rising fastest in countries with the smallest share of urban dwellers	156
Figure 4.10	The share of the urban population living in slums is declining worldwide.	160
Figure 4.11	Southeast Asian cities vary in the prevalence of slums	161
Figure 4.12	Use of improved water drinking sources within Southeast Asia.	161
Figure 4.13	Use of improved sanitation facilities within Southeast Asia	162
Figure 4.14	An agenda for national action on green growth in developing countries	163
Figure 4.15	Two ASEAN countries are among the top five recipients of adaptation-related ODA in urban areas	166

Figure 4.16	Viet Nam receives the lion's share of ODA for urban adaptation and mitigation	166
Figure 4.17	ASEAN ambition is generally low for new light duty vehicle emissions standards	173
Figure 4.18	Reductions in diesel sulphur levels have been slow.	173
Figure 4.19	Access to services is a high priority for urban adaptation ODA in Southeast Asia	174

Tables

Table 1.1	The ASEAN economies are projected to expand rapidly	30
Table 1.2	Governance in Southeast Asia can be improved	32
Table 1.3	Well-designed environmental tax reforms can have positive impacts.	36
Table 1.4	Barriers to entrepreneurship, trade and investment ASEAN countries.	43
Table 1.5	The informal employment sector is large	48
Table 1.6	A set of green growth indicators for Southeast Asian countries	51
Table 2.1	National ASEAN environment strategies vary in their focus on green growth	68
Table 2.2	National development plans reviewed for this study	71
Table 2.3	Green growth objectives in Southeast Asian countries' national development plans . . .	72
Table 2.4	Green growth co-ordination mechanisms in ASEAN countries	84
Table 2.5	Climate change co-ordination mechanisms in ASEAN countries.	85
Table 3.1	Natural capital is being depleted at different rates across ASEAN countries	98
Table 3.2	The status of UN-REDD+ programmes in Southeast Asia	108
Table 3.3	Different countries focus on different types of renewable energy	120
Table 3.4	Mineral production in the ASEAN region	128
Table 3.5	Rents from extractive industries are significant in Southeast Asia	128
Table 3.A1.1	Coal resources by country and type.	137
Table 3.A1.2	Oil and gas resources by country.	138
Table 4.1	Southeast Asian countries fall into three urban groups.	150
Table 4.2	Deaths from air pollution as share of urban population.	155
Table 4.3	Southeast Asian cities at high risk for climate-related natural disasters	157
Table 4.4	Number of people in Southeast Asian port cities exposed to a 100-year flood event, 2005 and in a 2050 scenario.	158
Table 4.5	Absolute and relative annual losses due to coastal flooding in 2005 and in a 2050 scenario	159
Table 4.6	Countries vary in their attention to urban policies in national green growth, climate change and sustainable development plans	164
Table 4.7	Four broad categories of metropolitan governance bodies in OECD metropolitan areas . .	168
Table 4.8	Many actors are involved in financing urban public transport systems in developing countries.	171
Table 4.9	A range of financing tools can channel private investment in sustainable transport infrastructure	172
Table 4.10	National policy levers to manage urban green growth in Southeast Asia	177

Boxes

Box 1.1	Adapting green growth to developing countries	29
Box 1.2	How is official development assistance supporting green growth?	33
Box 1.3	How can development co-operation providers contribute to environmental tax reforms? 37	
Box 1.4	Competition policies in ASEAN countries	44
Box 1.5	National experiences with green growth indicators.	52
Box 2.1	Green growth strategies in Cambodia and Viet Nam	69
Box 2.2	Mainstreaming climate change adaptation in the Philippines	73
Box 2.3	Indonesia's cross-sectoral climate change mitigation plans.	75
Box 2.4	Energy security and national development in the Philippines and Cambodia.	79
Box 2.5	Combining energy security and sustainability in Malaysia's New Energy Policy	79
Box 2.6	Energy efficiency in national development plans	81

Box 2.7	Government support for green technology and innovation	82
Box 2.8	Examples of climate change co-ordination mechanisms in Southeast Asia	85
Box 3.1	Weak versus strong sustainability in natural resource management	95
Box 3.2	Brazil's success in combatting deforestation through better monitoring and enforcement	105
Box 3.3	How do payments for ecosystem services work?	106
Box 3.4	Supporting countries in implementing REDD+	107
Box 3.5	Assessing the value of forest ecosystem services in Leuser National Park, Indonesia	108
Box 3.6	OECD policy guidance for investment in clean energy infrastructure	122
Box 3.7	Private sector participation in the ASEAN electricity sector: a review	124
Box 4.1	Viet Nam is incorporating urban policies into its green growth and climate change strategies	165
Box 4.2	Upgrading slums to build climate resilience	175
Box 4.3	The 100 Resilient Cities programme	176

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Acronyms

ASEAN	Association of Southeast Asian Nations
CBFM	Community-based forest (or fishery) management
CO₂	Carbon dioxide
CSO	Civil society organisation
DAC	OECD Development Assistance Committee
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
GDP	Gross domestic product
GHG	Greenhouse gases
GNI	Gross national income
GtCO₂e	Gigatonnes of carbon dioxide equivalent
IEA	International Energy Agency
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
PM	Particulate matter
R&D	Research and development
REDD, REDD+	Reduction in Emissions from Deforestation and Forest Degradation
TPES	Total primary energy supply
UNDP	United Nations Development Programme
WHO	World Health Organization

Executive summary

Southeast Asia's booming economy presents tremendous growth potential, but also big interlinked economic, social and environmental challenges. The region's current growth model is based in large part on natural resource exploitation, which exacerbates these challenges. Policy makers and leaders from the private sector and civil society across the region are aware of these problems and are seeking a more sustainable growth model. It will take visionary leadership to implement the structural changes needed to simultaneously achieve economic growth, reduce poverty, protect the environment and improve well-being. This report provides evidence that, with the right policies and institutions, Southeast Asia can pursue green growth and thus sustain the natural capital and environmental services – including a stable climate – on which prosperity depends.

Leaders throughout the region are aware of the challenges ahead. They have already made efforts to improve environmental performance, while simultaneously stimulating strong economic growth rates and lifting millions out of poverty. But adopting a grow-now-and-clean-up-later approach that deals separately with economic and environmental performance will not be enough. It will prevent Southeast Asian leaders from responding effectively to fundamental pressures that could constrain growth and affect well-being: the threat of resource scarcity and diminishing returns on resource exploitation, increasing levels of pollution, and burgeoning urban populations.

The OECD actively advises its member countries on ways to accelerate structural change and the shift towards green growth. This report tailors its expert advice to the Southeast Asian region, building on consultations with government officials and regional experts. It makes the case for green growth and sets out ideas for achieving it through four key themes (corresponding to four chapters): a coherent institutional and policy framework, a clear green growth strategy integrated into national development plans, a sustainable approach to natural resource management, and a well-managed and nationally coordinated approach to urban growth. Examples and experience from within the region demonstrate that viable options already exist. These must now be scaled up to make growth green and inclusive.

Three key messages emerge from the report:

Message 1: Green growth is not a separate strategy from long-term economic growth and higher levels of well-being, but rather is a means to achieve them

Economic growth, human well-being and environmental performance are inseparable. The future of the region's population and the profitability of its economic activities will depend on policy makers and businesses accepting and acting on this. Evidence from around the region shows that environmental degradation is already undermining human well-being and economic growth. Yet there are ways in which economic and environmental performance can be mutually beneficial. For example:

- Outdoor air pollution resulted in nearly 200 000 deaths in the region in 2010, costing over USD 280 billion, based on statistical value of life calculations, i.e. the

value people attach to not having their lives cut short by pollution-related health problems. By reducing air pollution, better public transport can reduce these costs and benefit the economy by easing congestion and increasing productivity.

- Shrimp farming in Thailand has helped destroy 50-60% of the mangroves that were providing coastal protection, especially essential now that climate change is exacerbating flooding. With about 20% of Southeast Asia's population directly dependant on fisheries for livelihoods and an even larger share for protein intake, managing fisheries in a sustainable way will be vital.
- Coastal flooding in Southeast Asian cities cost an estimated USD 300 million in average annual losses in 2005; even with significant investment in adaptation the price tag could climb to USD 6 billion a year by 2050. Installing climate-resilient infrastructure now and being much more ambitious in adaptation efforts could limit the damage and attract businesses seeking long-lasting, resilient investments.
- Deforestation and the destruction of topsoil have led to costly, catastrophic flooding – witness the Thai floods in 2011. Preserving natural forests has multiple benefits – from water and air filtration to flood prevention. Well-designed payment for ecosystem services, as in Viet Nam, can help to conserve forests and natural landscapes and therefore deliver these benefits, while also improving local livelihoods.
- Fossil fuel subsidies in Southeast Asia amounted to about USD 51 billion in 2012, equivalent to about 11% of all general government spending. Indonesia has the largest fossil fuel subsidy programme in the region, amounting in 2012 to about 15% of general government expenditures and 60% of public expenditures on education and health. Removing or reducing these subsidies – while alleviating any social impacts and investing the savings in education, health and social welfare programmes – will simultaneously reduce environmental pressures and increase well-being.

Message 2: The window of opportunity for green growth is open now

Southeast Asia is at a turning point. The region is undergoing deep transformation and modernisation underpinned by strong – but unsustainable – economic growth. Today's decisions by policy makers and business leaders will determine the sustainability of the region's development path for decades – and potentially centuries – to come. Delayed action risks missing three golden opportunities:

1. **To sustain the region's natural wealth.** Southeast Asia's natural resources provide essential services that must be sustainably managed or they will be lost forever. Natural resources underpin key economic activities such as agriculture, forestry and mining. Ecosystem services – such as air and water filtration, pollination, and many others – are essential to human well-being and cannot be replaced by man-made capital. Their loss could trigger irreversible changes in environmental and economic systems, with significant consequences for future prosperity.
2. **To lock in clean and resilient infrastructure.** Infrastructure and the built environment are being determined now, defining energy consumption, pollution levels and resilience for decades to come. Southeast Asia can still leapfrog 20th century technologies and infrastructure by adopting clean, viable and economical alternatives. To keep costs and risk low, leaders need to act now to shape dynamic cities so that they are resource-efficient, resilient to climate change and provide essential services for the urban poor.

3. **To become a hub for green investment.** Public and private finance providers are increasingly seeking green investment opportunities as part of a growing international and domestic trend towards investment portfolios whose profits go hand-in-hand with environmental performance. Southeast Asia has the opportunity to lead this global shift, given its rapid industrialisation and natural resource wealth. However, recent developments have not always been in the right direction. For instance, between 2000 and 2011 the share of renewable energy sources in the region's total energy supply actually decreased. Current policies provide insufficient and unsteady support for renewable energy, while subsidies unduly favour coal and other fossil fuels. Southeast Asian leaders can create the enabling conditions – through clear and predictable policies and regulations – to mobilise public and private funds towards green investment projects.

Message 3: Political leadership is the key to putting the right policies and institutions in place

Governments are only as strong as they are courageous: leaders must move beyond today's incremental and isolated progress to instead embrace a different kind of economy. This will mean:

- *Strengthening governance and reforming economic structures.* Good governance (e.g. rule of law, a tough stance on corruption, well-enforced property rights) is the bedrock of sound economic, social and environmental policies. Consistent and credible policy signals grounded in robust governance will reduce uncertainty and encourage green and resilient investment. For example, taxing pollution and resource use instead of labour, income and capital will reduce economic distortions, thereby supporting economic growth, improving resource efficiency and protecting the environment. Phasing out unsustainable subsidies, such as for fossil fuels and some types of agriculture, will tackle inefficient natural resource use and pollution. They can be redirected instead to support social programmes for the poor and mechanisms for clean investments. With the right standards and price signals, strengthening competition policies will stimulate the deployment of cleaner and more energy-efficient technologies. Training workers, improving health and education, and upgrading skills will facilitate and lower the costs of the transition towards green growth.
- *Mainstreaming green growth into national development plans and government processes.* National green growth strategies are important but must be integrated into national development plans to bring about real change. This can create synergies between green growth objectives and other national priorities, such as energy security and poverty reduction. For instance, today's reliance on coal to meet rising energy demands will degrade the environment and undermine energy security through growing import dependence, volatile international prices, and high and rising air pollution costs. On the contrary, doing more to exploit the region's abundant renewable energy sources will improve energy security and protect the environment at the same time. Exploiting synergies such as these will require new and better co-ordination mechanisms across ministries and among national, provincial and municipal governments.
- *Accounting for the essential ecosystem services provided by natural resources and ending open-access exploitation.* In addition to their market value, the full non-market value of natural resources needs to be recognised in any policy or

business decision involving their use. Better monitoring of the quantity and quality of natural resources and the development of natural capital accounting will be important. Ending open-access exploitation will mean strengthening property rights, enabling community-based resource management, expanding payments for ecosystem services and stepping up environmental law enforcement.

- *Guiding the sustainable growth of cities to ensure well-being and prosperity.* By 2050, 65% of the region's population are expected to be living in urban areas. Poorly managed and unsustainable urban development will undermine green growth. National governments can support urban action by incorporating urban priorities into national green growth, climate change and resilience strategies. For example, national policy can strengthen cities' capacity to seek innovative forms of financing for green infrastructure. Reforming national tax policy and planning processes can encourage compact urban growth and promote investment in urban water, sanitation and transport infrastructure. National government support can increase capacity for urban adaptation and encourage inter-municipal co-ordination to address environmental performance throughout metropolitan areas.

All these policies will deliver the economic and environmental benefits on which Southeast Asian countries' prosperity – and businesses' profitability – will depend.

Conclusion

How to balance short-term economic benefits with long-term well-being and security is a conundrum facing every economy. Today, the emergence of clean and energy-efficient technologies and the adoption of better standards and regulations mean that those nations and regions that pursue green growth will gain a competitive advantage. This report is a guidepost for Southeast Asian policymakers seeking this advantage. It reviews initiatives already underway in the region, presents evidence and ideas, and provides a targeted policy framework. Each country however will need to identify its own solutions. Those that seize the opportunities offered by green growth will be the economic winners of the 21st century.

Chapter 1

The case for green growth in Southeast Asia

The ten member countries of the Association of Southeast Asian Nations (ASEAN) will need to shift to a more sustainable development path in order to sustain economic growth, reduce poverty and achieve durable gains in well-being. Natural capital accounts for more than 20% of total wealth, well above the 2% average in OECD countries. Yet the rapid economic growth the region has enjoyed in the recent past has relied on intensive resource exploitation and is leading to the depletion of natural capital. Growing rates of pollution threaten health and productivity and, though still relatively low, ASEAN countries' share of global greenhouse gas emissions is expected to surge. The chapter outlines a set of framework policies for greening growth in the region, ranging from improving governance, tax reforms and the removal of fossil fuel subsidies to upgrading competition and labour market policies. It proposes a set of green growth indicators that can help policy makers to track progress towards green growth and evaluate policies.

Throughout the world, economic growth and development paths are on an unsustainable trajectory, putting at risk the natural assets and environmental services upon which long-term economic growth and human well-being depend (OECD, 2011a; OECD, 2012a). Addressing natural capital depletion, pollution, biodiversity loss and climate change is particularly urgent in developing countries, as these environmental challenges threaten to undermine their development efforts and reverse the gains in living standards and well-being that have been achieved to date (OECD, 2013a).

Among the ten member countries of the Association of Southeast Asian Nations (ASEAN, also referred to as Southeast Asia in this report), the need to shift to a more sustainable development path is urgent. Natural capital accounts for more than 20% of total wealth, well above the 2% average in OECD countries. Yet the rapid economic growth the region has enjoyed in the recent past has relied on intensive resource exploitation, which is leading to environmental degradation and may well prove to be unsustainable. On top of this, Southeast Asia is one of the regions of the world expected to be most affected by climate change (Dellink et al., 2014). The region now has a window of opportunity to shift to a green growth path. It is undergoing a deep transformation that will require profound changes to its “soft” (i.e. governance, regulation, human capital) and “hard” (i.e. transport, energy, waste management, communication) infrastructure. The direction these changes take could either contribute to or undermine green growth.

The ASEAN country group is very heterogeneous, including two high-income countries (Brunei Darussalam and Singapore), two upper middle-income countries (Malaysia and Thailand), three lower middle-income countries (Indonesia, the Philippines and Viet Nam) and three least developed countries (Cambodia, Lao People’s Democratic Republic – hereafter “Lao PDR” – and Myanmar) (OECD, 2013b). Indonesia is by far the most populous country in the region (240 million inhabitants), while Brunei Darussalam is the smallest (400 000). Despite this diversity, these countries face a number of common and interlinked environmental challenges, calling for decisive national responses accompanied by regional and international collaboration.

If the region is to sustain economic growth over the long term and achieve durable gains in human well-being, it will need to adopt a greener growth path. Green growth does not mean sacrificing economic growth or gains in living standards and poverty reduction – on the contrary, it means sustaining growth and well-being by ensuring they are underpinned by a healthy environment and natural assets that continue to provide essential resources and environmental services (OECD, 2011a). The cost of business as usual risks being high in economic, social and environmental terms.

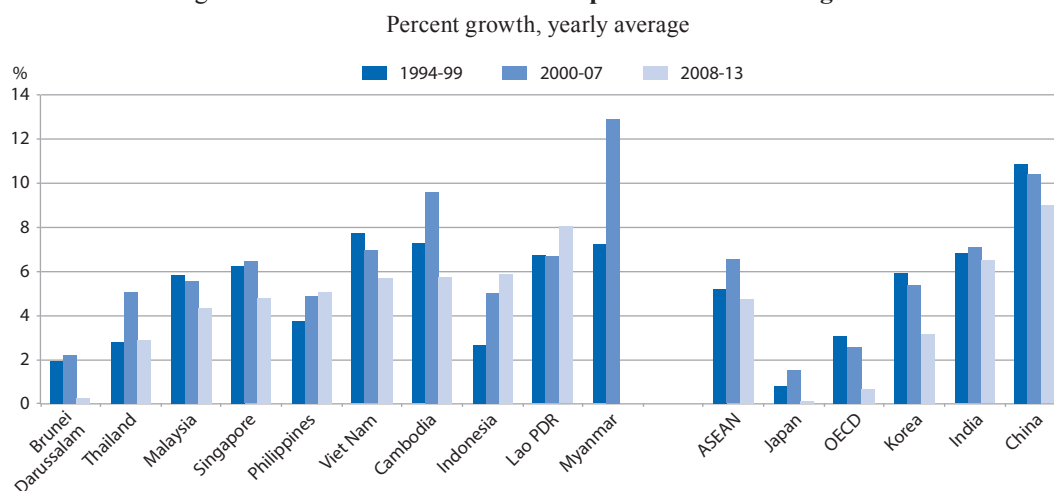
This chapter starts by reviewing recent macro-economic and environmental trends in the ASEAN economies, and then demonstrates how green growth is needed to sustain long-term economic growth and well-being. It then outlines a policy framework to help ASEAN countries shift towards a greener growth pathway. Finally it presents a set of easily measurable indicators to track regional progress towards green growth. Chapter 2 then outlines the strategic and institutional next steps required to shift countries onto a green growth path, and assesses to what extent each country is taking these steps. Chapter 3 reviews the challenges raised by natural resource use, focusing on energy, forests, fisheries and the extractive industries, while Chapter 4 explores how to manage rapid urbanisation across the region to meet national green growth objectives.

1.1. Recent macroeconomic performance has been strong

Economic performance in Southeast Asia has generally been strong over the past two decades. Since the 1990s, Southeast Asian countries' average GDP growth has been markedly higher than that of the OECD. Average growth is comparable to that of India, although lower than the People's Republic of China (hereafter "China") (Figure 1.1). This growth has contributed to dramatic gains in living standards and falling poverty rates. For the seven ASEAN countries for which comparable data are available (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Thailand and Viet Nam), the share of the population living on less than USD 2 per day (a common measure of extreme poverty) dropped from 70% in the early 1990s to 36% in the late 2000s, equivalent to about 86 million people escaping poverty.

The recent global economic crisis has not left ASEAN economies unscathed. Most of them, however, merely experienced a deceleration of real GDP growth, and recovery is under way (Figure 1.1). One exception is Thailand, whose significantly lower recent growth is partly due to the impact of widespread flooding in 2011 on the productive sector.

Figure 1.1. ASEAN countries have experienced fast GDP growth



StatLink <http://dx.doi.org/10.1787/888933167663>

Note: Data are not available for Myanmar for the 2008-13 period.

Sources: Authors' calculations based on OECD and World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed July 2013.

A number of factors have sheltered emerging and developing ASEAN economies from the global crisis:

- Their limited direct and indirect trade with Europe (OECD, 2013c).¹ The more open economies – such as Malaysia, Thailand and Cambodia – were hit by the crisis, partly because their textile industries were exposed to the United States and European markets. However, the shock was short-lived and these economies recovered rapidly.
- Structural reforms enacted in the wake of the Asian financial crisis in the late 1990s, which have enhanced the capacity of ASEAN economies to withstand

economic and financial shocks. For instance, the banking sector has become more solid as the capital adequacy ratios are above Basel III levels² and non-performing loan ratios and loan-loss provisions compare favourably with many developed economies (OECD, 2013c).

- Micro and small firms, often operating in the informal sector, have been a main source of growth and employment in many countries in the region, helping to support household incomes. A fall in registered unemployment was observed in several countries during the crisis, but at the same time the share of workers in vulnerable employment, predominantly in the informal economy, is estimated to have increased, reversing the trend observed from 2003 to 2008 (OECD, 2012b).

In the future, some of these factors may play a different role, however. Southeast Asian economies are becoming more integrated with the world economy, and this will increase their exposure to international shocks. The large informal labour market may recede if it is tackled decisively; formal labour markets will then need to be flexible enough for the economy to continue to be able to absorb shocks and facilitate workers' transition from declining to expanding sectors and firms.

In addition to the factors listed above, supportive macro-economic policies have underpinned consumption growth and large infrastructure programmes have boosted growth in some countries. Sizeable fiscal stimuli have also contributed to a fast economic recovery (Shimada and Yang, 2010). In many countries, easing monetary policy and macro-prudential measures also provided momentum to growth. Extensive dollarisation (i.e. the use of multiple currencies in the economy) in Viet Nam, Cambodia and Lao PDR has nonetheless limited the scope for monetary and exchange rate policies, weakening their ability to respond to major external shocks (OECD, 2013).

Massive liquidity injections from Japan and other developed economies have leaked into emerging Asia. These developments, however, raise the risk of asset bubbles (the overvaluation of assets) and the vulnerability of the region to sudden changes in investors' confidence. That said, most ASEAN economies are now in a position to mitigate the negative effect of a reversal in capital flows thanks to the accumulation of foreign reserves in recent years and their relatively healthy fiscal positions (Shimada and Yang, 2010).

Looking forward, the OECD Development Centre forecasts that real growth in the region will return to pre-crisis levels of 5.5% between 2013 and 2017. Strong domestic demand, especially private consumption and investment, will drive economic growth while exports will play a less important role. Fiscal deficits will generally decline, resulting in stable or declining public debt-to-GDP ratios. Indonesia is projected to reach a growth rate of 6.4% over the period, equalling the pace set before the 1997 Asian financial crisis. This favourable prospect reflects a significant improvement in its standing with international investors, ambitious infrastructure investment and ongoing economic reforms. Projected growth in Singapore is 3.1%, Malaysia 5.1%, the Philippines 5.5% and Thailand 5.1%. These countries' slightly lower growth forecasts reflect the risk of receding productivity gains and falling into the middle-income trap – so named because many middle-income countries are unable to achieve the economic growth and structural upgrading needed to attain high income levels (Jankowska et al., 2012). Growth in other parts of the region is projected to be more robust, with Cambodia reaching 6.9%, Lao PDR 7.4%, Myanmar 6.3% and Viet Nam 5.6%. Myanmar's outlook has improved following recent political reforms, which should encourage foreign investment (OECD, 2013).

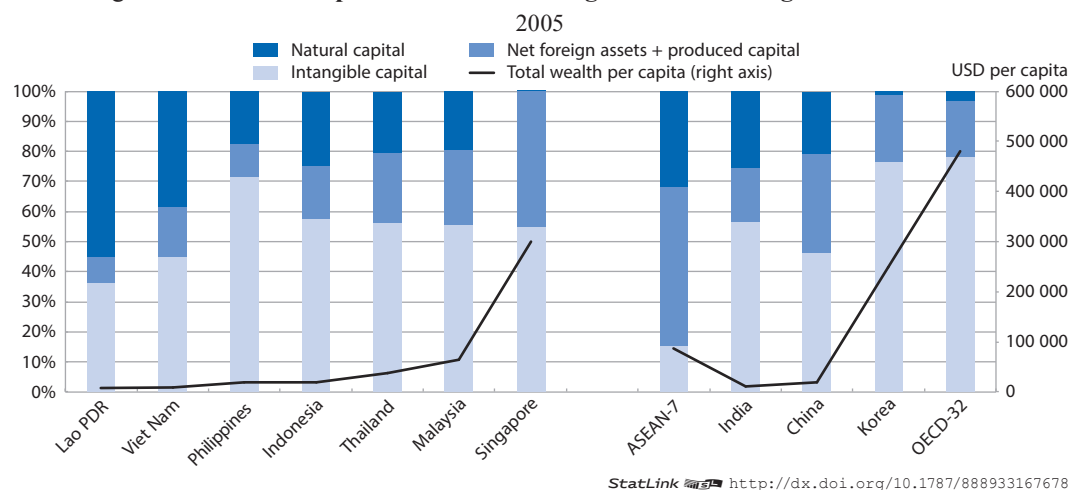
1.2. Environmental challenges threaten long-term growth and human well-being

Various environmental challenges, however, threaten to undermine the region's future economic growth trends and gains made in human well-being. Southeast Asian countries face a range of threats, including depletion of the natural resources on which many of their economies depend (see Chapter 3); the impact of air and water pollution on human health and development (see Chapter 4); and the damage to people, ecosystems and the economy caused by climate change.

Natural resources are being depleted

Natural resources account for an important share of total wealth in the region. As discussed in more detail in Chapter 3, on average in ASEAN countries natural capital accounts for more than 20% of total wealth, well above the 2% average in OECD countries (Figure 1.2). The value of natural capital per person is particularly high in Malaysia and Thailand. In absolute quantities, however, the production of natural resource-based products is the highest in Indonesia and Viet Nam. Oil, gas and round wood are the most important resources in the region. The production of oil and gas is significant in Brunei Darussalam, Indonesia, Malaysia, Thailand and Viet Nam.

Figure 1.2. Natural capital contributes a large share of the region's total wealth



Notes: natural capital is the sum of the value of crop and pasture land, timber, non-timber forest, protected areas, oil, natural gas, coal, and minerals. Non-natural capital is the sum of the value of net foreign assets, produced capital and intangible capital; intangible capital is the difference between total wealth and tangible capital, both produced and natural. Myanmar and Cambodia are excluded because of lack of data. ASEAN-7 is the arithmetic average of the countries appearing on the left side of the figure. OECD-32 is the arithmetic average of OECD countries excluding Estonia and Slovenia.

Source: Authors' calculations based on World Bank, The Wealth of Nations dataset, <http://data.worldbank.org/data-catalog/wealth-of-nations>, accessed March 2014.

Since 2000, ASEAN countries have experienced a substantial rise in material consumption and dramatic changes in material use profiles (Annex 1.A1). Construction materials and fossil fuels have been the fastest growing components of material consumption, closely linked to growing GDP. Large amounts of sand, gravel and other bulk construction materials have been used to build urban transport infrastructure and manufacturing plants. Use of biomass for energy has also increased but at a slower speed. Its increase has been closely linked to population growth and is unrelated to GDP growth.

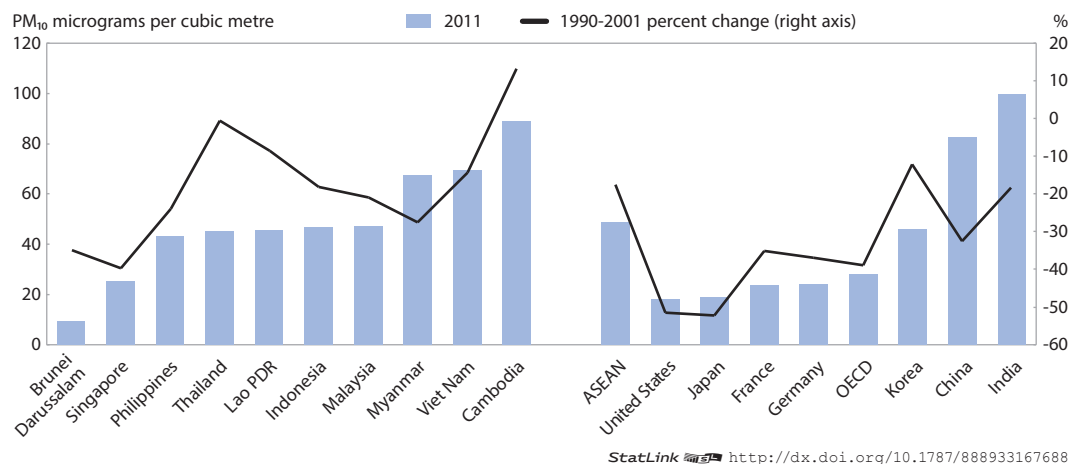
As a result of these trends, natural capital is being depleted at an increasing rate in most ASEAN countries, especially in Brunei Darussalam, Indonesia, Thailand and Viet Nam (Chapter 3). For example, every year between 1999 and 2008, Brunei Darussalam's natural capital stock was depleted by almost 40% of gross national income (GNI) on average, while Viet Nam, Malaysia and Indonesia experienced a yearly average decrease equivalent to about 10% of GNI. Yet preserving a certain share of natural capital is essential for sustaining social welfare and economic growth over the long run.

Air and water pollution pose serious threats to well-being

In many ASEAN countries, air and water pollution already threaten human well-being. A sharp increase in the number and the use of motor vehicles, rising industrial production and a growing reliance on coal-fired power plants in some countries are all contributing to higher rates of air pollution. Concentrations of particulate matter (PM), which contributes to premature death from cardiovascular disease and lung cancer, among other diseases, are very high in the region (for more see Section 4.2 in Chapter 4). For instance, compared to Germany and France, for instance, PM levels are five to six times higher in Viet Nam and Indonesia and four times higher in Myanmar, Cambodia and Lao PDR (Figure 1.3). Even so, ASEAN countries perform relatively well when compared to China.

Over the last 20 years, PM₁₀ concentration levels have declined markedly in Southeast Asia, rising only in Cambodia (Figure 1.3). This good regional performance can be attributed to pollution control measures implemented by the ASEAN governments (Sheng, 2012), including the gradual improvement and enforcement of air quality regulations and emission standards. For instance, in Jakarta the wide-scale adoption of inspection and maintenance programmes for in-use vehicle has reduced emission by about 50% (Schwela et al., 2006). Despite these efforts, concentrations of particulate matter on average are higher in ASEAN cities than in OECD cities and do not meet the World Health Organization (WHO) air quality standards (see Figure 4.7, Chapter 4). Chapter 4 discusses how pollution levels in Southeast Asian cities can be contained.

Figure 1.3. Air pollution is generally high in ASEAN countries



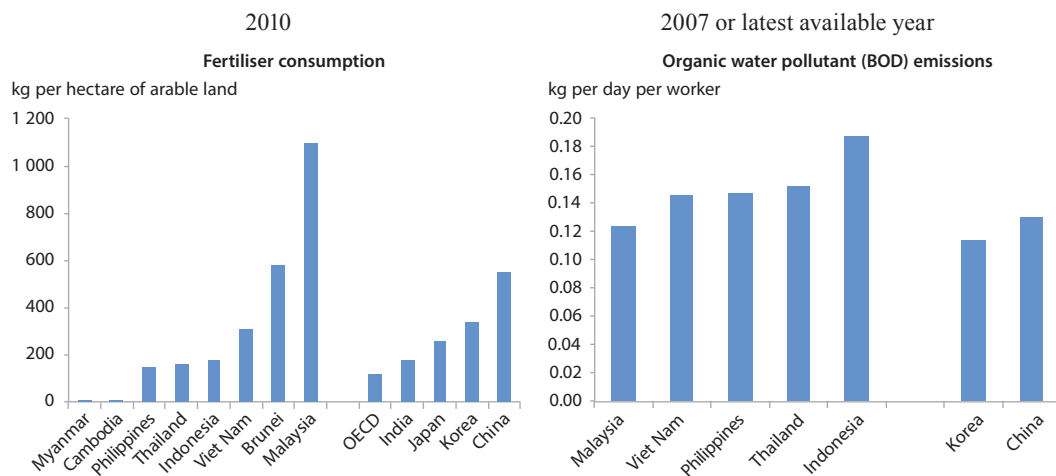
Note: Data for countries and aggregates for regions and income groups are urban-population weighted PM₁₀ levels in residential areas of cities with more than 100 000 residents.


Source: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed July 2014.

The rapid pace of industrialisation in some ASEAN countries is also contributing to water pollution, adding to pollution coming from agriculture and the residential sector (Evans et al., 2012). Although there is a dearth of cross-country comparable data on water pollution, national and regional sources suggest that water pollution is a significant environmental challenge in Southeast Asia. For instance, in Indonesia, 19 of the 33 rivers monitored in 2008 were found to be polluted to some extent. In 2007, the water of 48% of the rivers in Thailand was classified as poor (ASEAN, 2009). Monitoring by the Mekong River Commission across the Greater Mekong Subregion suggests that while in upstream sections water quality remains good, in downstream sections urban centres and industry cause significant water pollution (Evans et al., 2012).

Water contamination from inadequate sanitation facilities, improper wastewater disposal and animal waste has a large impact on human health (Corcoran et al., 2010). This is likely to pose significant environmental challenges in Southeast Asia, where a large share of the region's population still lacks access to sanitation facilities (see Chapter 4). Worldwide, agriculture is the most important non-point source pollution of surface water and groundwater (Chhabra et al., 2010). Fertilisers are a major source of pollution, yet they are subsidised in some Southeast Asian countries. Agricultural fertiliser consumption per hectare is broadly in line with consumption in industrialised countries. Nevertheless, there are some outliers – for example in Malaysia fertiliser consumption per hectare is especially high (Figure 1.4).³ Rising food demand driven by growing populations and higher living standards means that the use of fertilisers may increase in Southeast Asia.

Figure 1.4. **High levels of fertiliser consumption and organic water pollution**



StatLink  <http://dx.doi.org/10.1787/888933167697>

Note: BOD stands for biochemical oxygen demand.

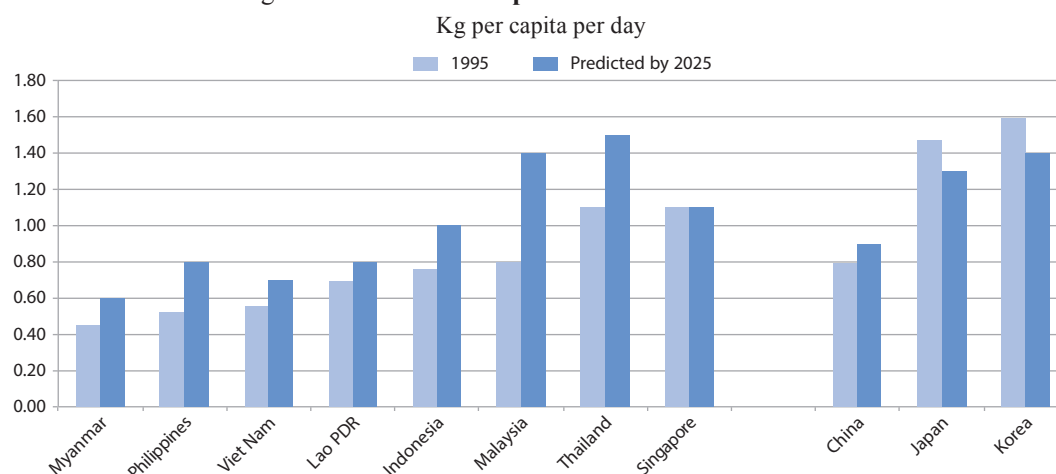
Source: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed June 2014.

Waste is a growing problem

Waste generated by households and businesses already represents a serious environmental challenge in many ASEAN countries. Municipal solid waste makes up the bulk of the waste in most countries in the region (ASEAN, 2009). While low and middle-income ASEAN countries produce considerably less waste than more developed countries in the region (e.g. Singapore), and Japan and Korea, rapid urbanisation, industrialisation and strong economic growth are likely to see the amount of waste increase rapidly (Figure 1.5).^{4,5} Waste prevention and recycling rates

are very low. Sanitary landfills and open dumps are the predominant form of waste management, especially in the least developed countries, although there are large differences across countries (ASEAN, 2009). Open dumps are the most hazardous waste disposal methods as they can easily pollute air and ground water. Some countries have been taking decisive actions to limit urban waste production and dispose of it properly. For instance, Singapore recycles more than 50% of all solid waste (including industrial waste) and Malaysia more than 20%. Yet recycling rates are much lower in the other ASEAN countries (ASEAN, 2009).

Figure 1.5. **Urban waste production is on the increase**



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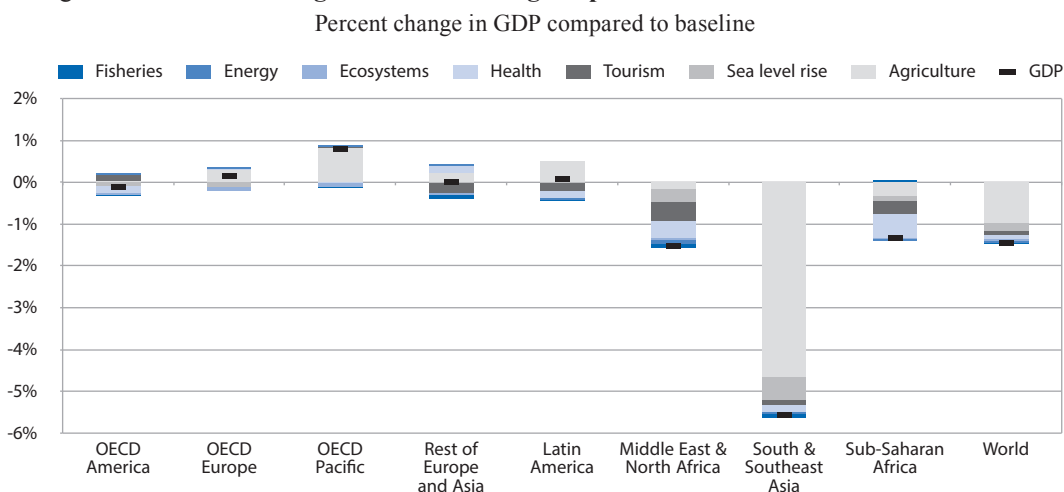
Source: ADB (2011), *Toward Sustainable Municipal Organic Waste Management in South Asia*, Asian Development Bank, Manila.

Vulnerability to climate change-related disasters is high

The ASEAN region is one of the world's most vulnerable to natural disasters, including those that may be linked to climate change. Between 1980 and 2009, up to 85% of deaths and 38% of global economic losses from natural disasters were in the Asia-Pacific region (UNESCAP-ADB-UNEP, 2012). Disasters such as Cyclone Nargis in Myanmar in 2008, the 2011 floods in Thailand and Typhoon Haiyan in the Philippines in 2013 were among the worst ever recorded in these countries. For instance, according to World Bank estimates, the damage caused by the 2011 floods in Thailand amounted to about USD 45.7 billion (around 13% of GDP in 2011) (World Bank, 2011). In order to mitigate costs associated with the increasing likelihood of such disasters, countries in Southeast Asia will need to improve land-use planning and invest more in flood protection, improved drainage and the construction of flood barriers (Chapters 3 and 4).

Model simulations suggest that Southeast Asia will be the region of the world most negatively affected by climate change in the coming decades. According to recent OECD modelling, climate change could result in a GDP loss of more than 5% higher in 2060 compared to a baseline involving no climate change damage (Figure 1.6). A large share of the GDP losses is likely to occur in the agricultural sector, which is still an important driver of economic growth, especially in low-income ASEAN countries (ADB, 2012). Rainfed and flood-based agriculture in river basins is widespread; here a predictable climate and stable weather conditions are essential for sustaining yields, income and livelihoods. Changes in regional temperature and precipitation patterns are expected to reduce yields, with a consequent loss in export market share. A smaller share of GDP losses is likely due to sea-level rise in Southeast Asia.

Figure 1.6. Climate change could have a large impact on GDP in Southeast Asia in 2060



Note: The category “South and Southeast Asia” includes ASEAN countries plus India and other developing Asian countries; “OECD America” includes United States, Canada, Mexico and Chile; “OECD Europe” includes France, Germany, Italy, United Kingdom, other OECD EU countries, plus Iceland, Norway, Switzerland, Turkey and Israel; “OECD Pacific” includes Japan, Korea, Australia and New Zealand; “Rest of Europe and Asia” includes non-OECD EU countries, Russia, non-EU European countries, Caspian countries and China; “Latin America” includes Brazil and other Latin American countries; “sub-Saharan Africa” includes South Africa and other African countries.

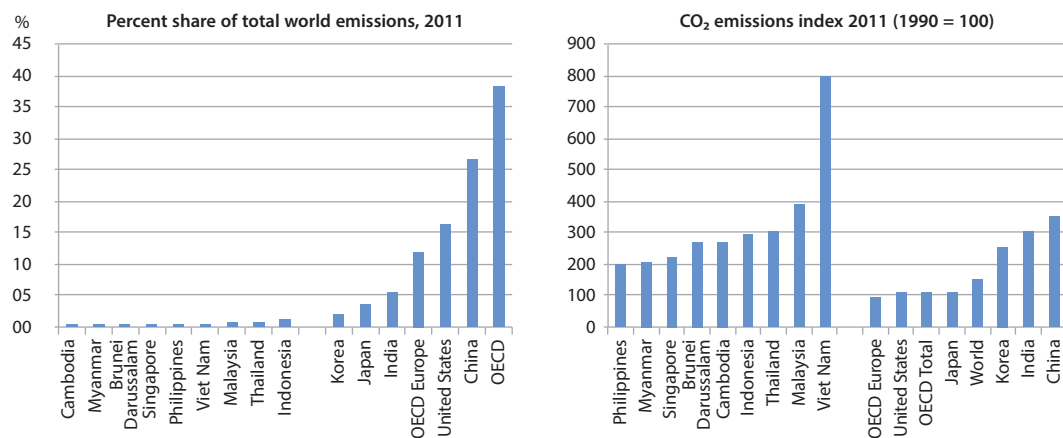
Source: Dellink, R., E. Lanzi, J. Chateau, F. Bosello, R. Parrado and K. de Bruin (2014), “Consequences of Climate Change Damages for Economic Growth: A Dynamic Quantitative Assessment”, *OECD Economics Department Working Papers*, No. 1135, OECD, Paris.

ASEAN countries’ carbon dioxide emissions are negligible globally but rising sharply

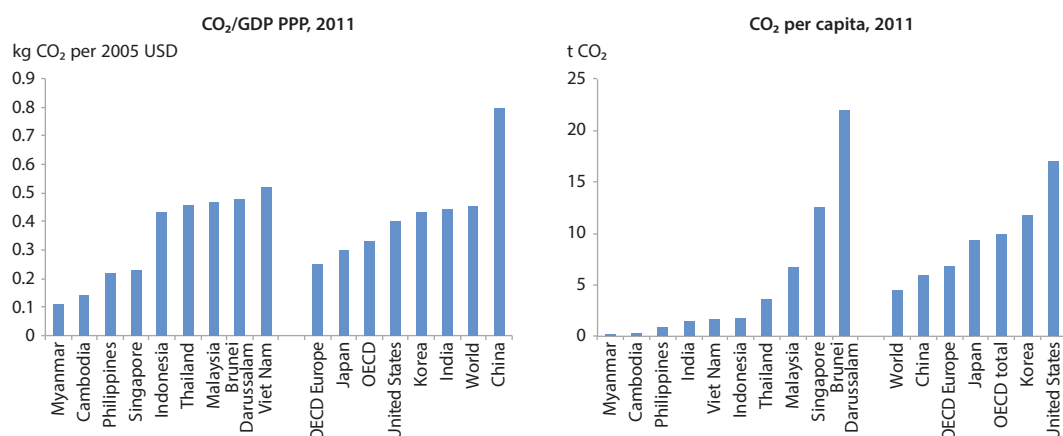
The ASEAN region represents a tiny share of the world’s total carbon dioxide (CO₂) emissions (excluding other greenhouse gases). The 10 countries account for just over 3.5% of global CO₂ emissions (Figure 1.7). While the share of emissions by Cambodia, Myanmar and Brunei Darussalam are almost zero, Indonesia is responsible for more than 1% of global CO₂ emissions. Currently, these shares are negligible, especially compared to China’s 25% and the OECD area’s almost 40%.

Nevertheless, the ASEAN countries’ share in global emissions is expected to surge, driven by rapid economic growth and rising urbanisation rates. According to the International Energy Agency, energy-related CO₂ emissions in the ASEAN region are likely to double between 2011 and 2035 (IEA, 2013a). Between 1990 and 2011, CO₂ emissions recorded a twofold increase in the Philippines, Myanmar and Singapore, an eightfold increase in Viet Nam, and tripled in the remaining countries (Figure 1.7). These growth rates are well above those observed in the developed world over the same period, but are broadly comparable with those of non-ASEAN emerging market economies such as China and India.

Figure 1.8 breaks down emissions into two components: emissions *per capita* income (right panel) and the CO₂ intensity of producing one unit of GDP (i.e. the CO₂-to-GDP ratio, shown in the left panel). *Per capita* CO₂ emissions are still almost nil in Myanmar and Cambodia and very low in the Philippines and Viet Nam, while Singapore and Brunei Darussalam are among the largest *per capita* emitters in the world (Figure 1.8). The low CO₂ emissions *per capita* of most Southeast Asian countries are largely explained by their low income *per capita*. The CO₂-to-GDP ratio is close to the OECD average. Myanmar

Figure 1.7. ASEAN countries' small but growing share in global CO₂ emissionsStatLink <http://dx.doi.org/10.1787/888933167723>

Source: Authors' calculations based on IEA (2013b), *CO₂ Emissions from Fuel Combustion Statistics 2013*, International Energy Agency, Paris, www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion-highlights-2013-.html.

Figure 1.8. CO₂ emissions are higher per unit of GDP produced than per capitaStatLink <http://dx.doi.org/10.1787/888933167738>

Source: Authors' calculations based on IEA (2013b), *CO₂ Emissions from Fuel Combustion Statistics 2013*, International Energy Agency, Paris, www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion-highlights-2013-.html.

and Cambodia are the least carbon-intensive economies in the ASEAN as they still need to fully develop modern energy sources (Chapter 3). Viet Nam has the largest CO₂ intensity per unit of GDP, followed by Brunei Darussalam and Malaysia.

The CO₂ intensity of GDP can in turn be broken down into two elements: the CO₂ intensity of energy production and the energy intensity of GDP (the energy supply-to-GDP ratio) (Figure 1.9).

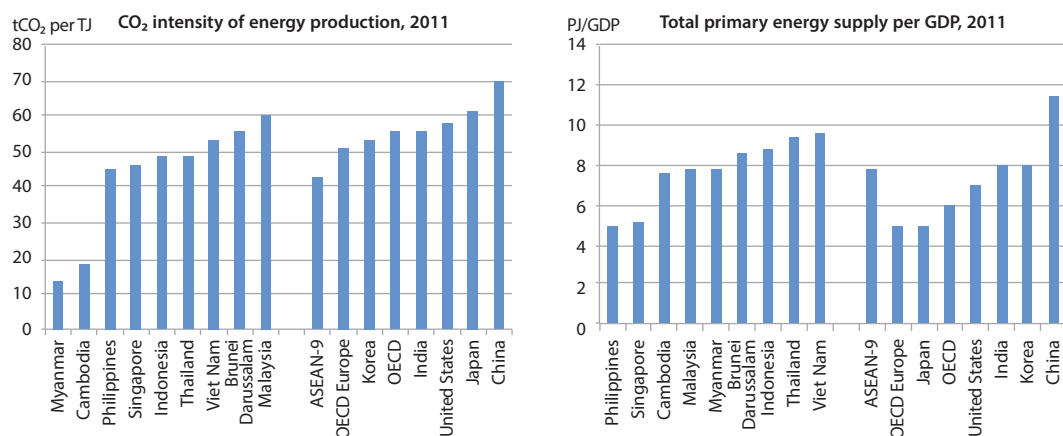
- On average, Southeast Asian countries perform better in terms of their CO₂ intensity of energy production than OECD countries, China and India (Figure 1.9, left panel). This can be explained by the large share of renewables in the energy mix in Southeast Asia (Chapter 3). For example, Myanmar and Cambodia have


the least carbon-intensive energy production because of the large share of their populations still relying on traditional biomass for domestic energy. In the other Southeast Asian countries the carbon intensity of energy production is closer to the OECD average (except Malaysia).

- Southeast Asian countries compare less well in terms of their energy intensity of GDP, which is markedly higher than the OECD on average – on a par with India, but still lower than China (Figure 1.9 right panel). Viet Nam and Thailand are the most energy-intense countries, while the Philippines and Singapore are the least.

Overall, this suggests that reducing energy intensity is a priority for Southeast Asian countries. Improving energy efficiency will result in a triple dividend: reducing pollution, conserving scarce natural resources and improving the international competitiveness of the region's economies. Governments are aware of this trend and some have set voluntary climate change targets (Chapter 2). However, progress in this area has been slow. From 1980 to 2011 energy intensity improved by only 12%, against 26% worldwide, 38% in OECD countries, 74% in China and 44% in India (IEA, 2013a). Over the same period, the region's industrial energy intensity – measured as energy consumed per unit of industrial value added – worsened by 0.2% per year. Southeast Asian countries have generally failed to fully tap into available technical potential for raising energy efficiency. However, governments in the region are acutely aware of this issue and are taking action. For instance, Singapore has implemented the Energy Conservation Act, requiring a co-ordinated industrial approach to energy efficiency, and Malaysia has adopted a long-term National Energy Efficiency Master Plan.

Figure 1.9. Reducing energy intensity is a priority for Southeast Asian countries



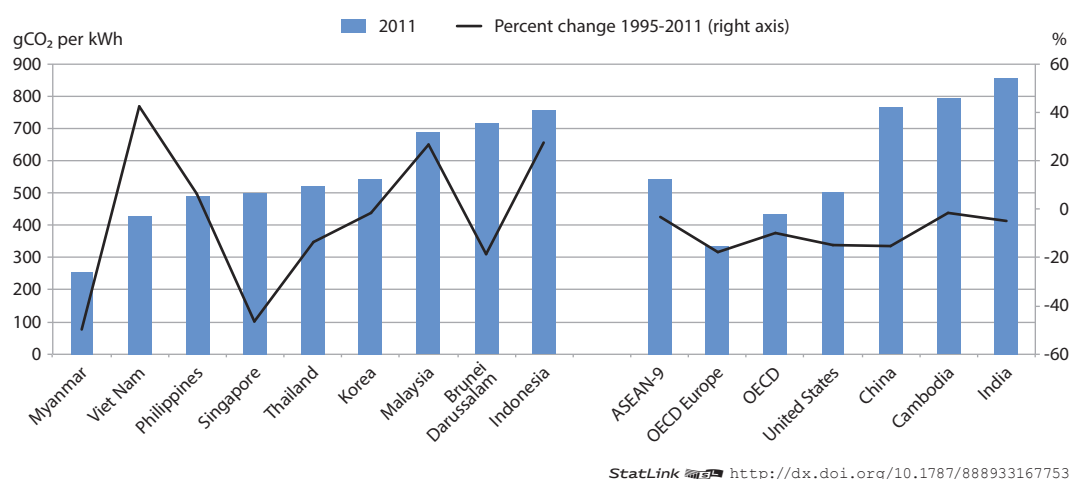
StatLink  <http://dx.doi.org/10.1787/888933167743>

Note: The CO₂ intensity of energy production is expressed as tonnes of CO₂ emitted per total primary energy supply (in terajoules or TJ); total primary energy supply (TPES) per GDP is expressed as petajoules (PJ) of TPES per GDP in USD 2005 purchasing power parity. ASEAN-9 is the arithmetic average of the countries appearing on the left side of the figure.

Source: Authors' calculations based on IEA (2013b), *CO₂ Emissions from Fuel Combustion Statistics 2013*, International Energy Agency, Paris, www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion-highlights-2013-.html.

The sources for electricity production may explain the carbon intensity of total energy production, especially in those countries in which electricity represents an important share of total energy use. Myanmar is the most carbon-efficient country in this respect because of the large share of electricity generated by hydropower (Figure 1.10). Other countries in the region, such as China and India, have some of the most carbon-intense electricity production, largely due to the high share of coal in the electricity mix. CO₂ emissions from electricity generation could be contained by using more carbon-efficient fossil-fuel technologies – such as supercritical and ultra-supercritical coal technologies – which can use existing electricity sources more efficiently (IEA, 2012). However, the high up-front capital costs of these more efficient coal technologies may limit their adoption in Southeast Asia, especially in the least developed countries. These countries therefore need to decisively orient the mix of energy sources towards renewables to successfully limit their CO₂ emission in the years to come.

Figure 1.10. CO₂ intensity of electricity production could be reduced



Note: kWh is kilowatt hour, a unit of energy equivalent to one kilowatt of power expended in one hour. ASEAN-9 is the arithmetic average of the countries appearing on the left side of the figure.

Source: Authors' calculations based on IEA (2013b), *CO₂ Emissions from Fuel Combustion Statistics 2013*, International Energy Agency, Paris, www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion-highlights-2013-.html.

1.3. Green growth is necessary for sustained economic growth and improved well-being

Green growth can help Southeast Asian countries meet the challenge of sustaining economic and social development in the short term while safe-guarding longer-term economic performance and human well-being. The OECD's green growth strategy, *Towards Green Growth*, sees green growth as a way to foster economic growth and development while ensuring that the environment continues to provide the resources and environmental services on which human well-being depends (OECD, 2011a). Rather than replacing the concept of sustainable development, green growth is a means to achieve it. *Putting Green Growth at the Heart of Development* (OECD, 2013a) adapts the green growth strategy to a developing country context. It identifies how green growth can contribute to development and responds to the concerns about green growth raised by developing countries themselves (Box 1.1).

Box 1.1. Adapting green growth to developing countries

Developing countries face the challenge of improving living standards quickly but in a way that does not undermine human well-being. The environmental challenges developing countries face are exacerbated by persistent development challenges, including high rates of poverty; young, fast-growing populations; strong dependence on natural capital; and limited access to energy, water and sanitation services.

The potential benefits of green growth to developing countries are many: the sustainable management of natural assets leading to stable growth and human well-being; new economic growth opportunities; infrastructure that does not lock countries into carbon and resource-intensive development paths; increased resilience to natural disasters; and greater energy security and lower greenhouse gas emissions

However, policy makers in developing countries understandably have several concerns about green growth: Will it help to reduce poverty? Will it be too costly? Will it hinder their efforts to gain access to international markets? Following regional consultations, the OECD has developed a twin-track agenda for national and international action. This is designed to allow developing countries to transition towards green growth while meeting their national development objectives. It will also help to channel resources and capacity from the international community to support country-led green growth.

Policies that contribute to green growth while improving the quality of the life of the poorest include:

- Removing fossil fuel subsidies and re-assigning them for social benefit, such as providing cheaper public transport or more accessible health care services.
- Sustainable certification schemes and eco-labelling programmes. These can become a new source of income in many developing countries with abundant natural resources if land tenure is secured and the certification schemes give a special premium to community-managed resources or small landholders.
- Payments for ecosystem services, which can reduce poverty if they explicitly target local communities and include capacity development to boost local households' ability to negotiate payment contracts.
- Greening investment, innovation strategies, labour and skill development policies, which can have even more significant impacts on development and poverty if these cross-cutting policies are designed to take into account pro-poor criteria, such as affordability and scalability.

For these benefits to be realised, green growth policy needs to be based on good governance and reflect a sound understanding of local context. Importantly it needs to be people-centred and to allow the voices of affected stakeholders to be heard in its design, implementation and evaluation.

Source: OECD (2013a).

Green growth requires decoupling economic growth from natural capital depletion and environmental degradation. Over the medium term (between 2010 and 2030), ASEAN economies are projected to expand by at least 5-6% every year (Table 1.1). Economic growth could be faster for the region's least developed countries (Cambodia, Lao PDR and Myanmar; Table 1.1).

Table 1.1. The ASEAN economies are projected to expand rapidly

	2012			2030			2012-13 average annual growth rate %	
	Popn.	GDP	GDP per capita	Popn.	GDP	GDP per capita	GDP	GDP per capita
Brunei Darussalam	0.412	16.95	41 127	0.542	25.77	47 561	2.4	0.8
Cambodia	14.865	14.05	945	18.363	54.80	2 984	7.9	6.6
Indonesia	246.864	876.72	3 551	277.059	2 121.34	7 657	5.0	4.4
Lao PDR	6.646	9.39	1 412	8.049	30.11	3 741	6.7	5.6
Malaysia	29.240	305.03	10 432	37.069	694.74	18 742	4.7	3.3
Myanmar	52.797	55.30	1 047	69.310	225.26	3 250	8.1	6.5
Philippines	96.707	250.18	2 587	127.336	663.42	5 210	5.6	4.0
Singapore	5.312	286.91	54 007	6.093	397.84	65 293	1.8	1.1
Thailand	66.785	365.97	5 480	67.759	823.66	12 156	4.6	4.5
Viet Nam	88.773	155.82	1 755	10.196	439.45	4 310	5.9	5.1
ASEAN	608.401	2 336.32	3 840	621.776	5 476.38	8 807.65	4.8	4.7

StatLink  <http://dx.doi.org/10.1787/888933168208>

Note: Popn. is population in millions; GDP is in current Billion USD; GDP per capita is in current USD.

Sources: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed August 2014; and ADBI (2014), *ASEAN 2030: Towards a Borderless Economic Community*, Asian Development Bank Initiative, Tokyo.

These projected growth rates, however, are based on current economic structures that risk being unsustainable. While contributing to GDP growth in the short term, current rates of resource exploitation are expected to result in severe natural capital depletion, eventually rendering those projected GDP growth rates unattainable (as discussed in Chapter 3). Also, unabated environmental degradation and pollution could entail higher than expected health care costs. This will divert resources from more productive investments, such as in education and infrastructure, and reverse hard-fought for gains in life expectancy and quality of life.

There is now evidence that economic growth and environmental protection are not only compatible, but can also be mutually reinforcing (OECD, 2011a). For example, recent studies of both developed and developing countries show that it is possible to lower pollution significantly without compromising long-term growth prospects. One study finds that government interventions to redirect investments toward green technologies would have short-term costs, but eventually long-term “green-growth” rates would catch up with “non-green growth” rates (Acemoglu et al., 2012). As a result, economic growth would be unaffected overall. Immediate action means a shorter catch-up period; delayed action results in a longer catch-up period and greater costs. For example, if Europe’s CO₂ emissions reduction target were increased from 20 to 30% by 2020, Europe’s annual rate of economic growth could rise by up to 0.6% by 2020, boosting investment as a share of GDP and resulting in six million new jobs (Jaeger et al., 2011).

For developing Southeast Asian countries, pursuing the developed countries’ “grow-now-and-clean-up-later” model is likely to mean higher economic and social costs than taking greener action now. Acting early to “lock in” green infrastructure and clean technology is especially important and achievable for those countries that still need to build much of their infrastructure. Countries that adopt green growth policies could stimulate the development of new industries associated with environmental technologies, thereby

enjoying a “first-mover” advantage (Zhang and Shi, 2014). This strategy would offer additional benefits to developing countries as they could leapfrog developed economies to more competitive and cleaner technologies.

In developing countries in Southeast Asia, the political and social acceptance of green growth policies rests on managing any trade-offs among economic development and poverty reduction. Fortunately, there are important complementarities between the two, which include: 1) increasing access to energy, water and transport services and more efficient infrastructure; 2) alleviating poor health associated with environmental degradation; and 3) introducing energy-efficient technologies that can reduce costs, and increase productivity, while easing environmental pressure (OECD, 2013a). However, high levels of poverty and inequality demand more targeted policies to avoid negative impacts on the poor, as discussed below. Capacities for designing and financing such policies are currently limited, however. Capacities for innovation and investment, both public and private, in green growth objectives are also lacking in the least developed Southeast Asian countries and will need to be improved.

When considering future growth patterns, it is essential that Southeast Asian governments take into account not only the potentially high costs of not going green, but also how to design green growth strategies that also support efforts to reduce poverty and gender inequality. In developing countries, women are generally more vulnerable to the effects of climate change than men; women constitute the majority of the world’s poor and are more dependent for their livelihood on those natural resources threatened by climate change. Often charged with the responsibility of securing water, food and fuel for cooking and heating, women have to deal directly with the challenges of environmental degradation (UN Women Watch, 2009).

Well-designed policies must consider how the economic and environmental benefits of green growth are distributed across the population in the short and long term (OECD, 2013a):

- In the short term cash transfer programmes may be useful to compensate poor households for the loss in purchasing power that a green growth transition might entail. For instance, removing energy subsidies (discussed below) is likely to affect the poorest most severely. Cash transfer programmes targeting the poor are the most effective and efficient way to offset these impacts.
- In the long term, Southeast Asian countries, especially the least developed ones, should continue their efforts to build effective social protection systems encompassing education, health and other social services. This will help shield the population, especially the poor, from both environmentally and non-environmentally-related income shocks. At the same time, effective social protection can make a positive contribution to economic growth by providing the social safety nets needed to promote entrepreneurship and labour mobility (Holzmann, 2001).⁶

1.4. The right framework conditions will ease the way towards green growth

Implementing green growth strategies will involve a mix of policies and instruments. However, these need to be implemented within a sound and coherent framework so as to reduce the short-term costs of moving towards a greener development model and to avoid social and competitiveness impacts on sectors, firms and households. Such an approach would enhance both popular and political support for green growth.


Governance and institutional capacity are the bedrocks of green growth

Governance and institutional capacity are key for implementing the wide-ranging policy reforms needed to design and implement green growth strategies (OECD, 2011a). Governments need the leadership and capacity to integrate green growth objectives into national development plans, poverty reduction strategies and broader economic policy making (these issues are analysed in Chapter 2). In addition, capacity is needed to develop consistent strategies for key economic sectors and the public finance management process (especially the budget process) and ensure this percolates through to sub-national levels.

In ASEAN countries, the quality of governance is improving but generally falls short of the highest global levels (Table 1.2). Governance also varies greatly among countries. Malaysia appears to perform best, while the poorest countries in the region, especially Lao PDR and Myanmar, score significantly lower. Other indicators, such as the Corruption Perception Index for 2013 developed by Transparency International, provide a similar picture, pointing to high levels of perceived corruption in all ASEAN countries except Singapore, Brunei Darussalam and Malaysia.⁷

Table 1.2. **Governance in Southeast Asia can be improved**
Selected governance indicators

	Control of corruption		Government effectiveness		Political stability		Regulatory quality		Rule of law	
	2000	2012	2000	2012	2000	2012	2000	2012	2000	2012
Brunei Darussalam	0.4	0.6	0.9	0.8	1.2	0.9	0.9	1.2	0.5	0.8
Cambodia	-0.8	-1.0	-0.8	-0.8	-0.9	-0.1	-0.2	-0.3	-1.0	-1.0
Indonesia	-0.9	-0.7	-0.3	-0.3	-2.0	-0.6	-0.2	-0.3	-0.8	-0.6
Lao PDR	-0.8	-1.0	-0.8	-0.9	-0.7	0.0	-1.5	-0.8	-0.9	-0.8
Malaysia	0.4	0.3	1.1	1.0	0.0	0.0	0.5	0.5	0.3	0.5
Myanmar	-1.3	-1.1	-1.2	-1.5	-1.7	-1.0	-2.1	-1.9	-1.3	-1.4
Philippines	-0.5	-0.6	-0.1	0.1	-1.4	-1.2	0.2	-0.1	-0.4	-0.5
Singapore	2.3	2.2	2.2	2.2	1.0	1.3	2.1	2.0	1.3	1.8
Thailand	-0.1	-0.3	0.2	0.2	0.4	-1.2	0.5	0.2	0.5	-0.2
Viet Nam	-0.6	-0.6	-0.4	-0.3	0.3	0.3	-0.7	-0.7	-0.3	-0.5
ASEAN	-0.2	-0.2	0.1	0.0	-0.4	-0.1	0.0	0.0	-0.2	-0.2
China	-0.2	-0.5	-0.1	0.0	-0.3	-0.5	-0.3	-0.3	-0.5	-0.5
India	-0.4	-0.6	-0.1	-0.2	-1.0	-1.2	-0.2	-0.5	0.3	-0.1

StatLink  <http://dx.doi.org/10.1787/888933168214>

Note: The score ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance.

Source: Authors' calculations based on World Bank, Worldwide Governance Indicators, <http://info.worldbank.org/governance/wgi/index.aspx#home>, accessed September 2014.

Given their rich endowment in natural resources, Southeast Asian countries need to pay particular attention to the governance and oversight of natural assets if they are to shift away from an open-access exploitation model to a rights-based management model (Chapter 3). In highly decentralised countries, such as Indonesia and the Philippines, establishing effective governance must involve all levels of government. Conflicting rules or practices at different government levels could cause national policies to compromise sub-national level green growth initiatives. By the same token, regional policies focusing

on flagship projects without considering how these fit within the national policy framework risk remaining isolated cases (OECD, 2011a).

Finally, the design and implementation of green growth strategies hinge on a certain degree of continuity of policies and commitments that go beyond electoral cycles. One way to achieve this is to establish independent institutions with responsibilities for green growth. This could work in the same way as independent central banks or regulatory authorities for network industries, which have lent greater credibility and stability to monetary policies and infrastructure management. Some Southeast Asian countries have already established such institutions (Chapter 2). These agencies are good steps towards ensuring continuity in the formulation and implementation of climate change policies and evaluating policies. Although high-level political leadership of these institutions is needed for the formulation of long-term plans and legislation, over time independence from political authorities may favour fair policy implementation and evaluation.

Development co-operation can do more to support green growth

Improved governance is also a necessary first step in strengthening international support for green growth. International development co-operation aligned with a national agenda for action on green growth can be an important conduit for the relevant finance and investment. Pursuing green growth will require substantial investment – in infrastructure for instance. While the richest Southeast Asian countries – Singapore and Brunei Darussalam and, to a lesser extent, Malaysia – will be able to mobilise domestic and international finance, the other Southeast Asian countries will probably need to attract resources from official development assistance (ODA) and other forms of official development finance (e.g. non-concessional or non-ODA development finance) (Box 1.2). Developed countries are committed under UN agreements to augmenting their financial support to environmental action in developing countries over the next decade, drawing on public and private sources (OECD, 2014a).⁸ Good governance and institutional capacity will make it easier to attract these forms of finance and manage them effectively.

Box 1.2. How is official development assistance supporting green growth?

Official development assistance (ODA) is already supporting green growth in developing countries. Available data indicate that today bilateral ODA* is an important channel for green development finance. For example, an assessment of multilateral and bilateral flows of ODA for climate change estimates that bilateral commitments are equivalent to or even greater than those flowing through multilateral channels (Buchner et al., 2011).

The OECD Creditor Reporting System (CRS) tracks the ODA from development co-operation provider countries who are members of the OECD Development Assistance Committee (DAC) and identifies ODA that specifically targets environmental objectives. It does so by using “policy markers”: co-operation providers are requested to indicate for each activity they report to the OECD whether or not it targets environmental objectives. Five statistical markers exist to monitor development co-operation for environmental purposes within the OECD DAC. These are the “environment” marker and four “Rio markers”, covering biodiversity, climate change adaptation, climate change mitigation and desertification. DAC analysis shows that the amount of bilateral ODA to the environment has been increasing. Annual average bilateral ODA commitments from OECD DAC members targeting environment as a “principal objective” have more than doubled since 2006/07, reaching USD 17 billion in 2010/11. Annual average bilateral aid commitments targeting climate change as a “principal objective” have quadrupled since 2006/07, reaching almost USD 12 billion in 2010/11.

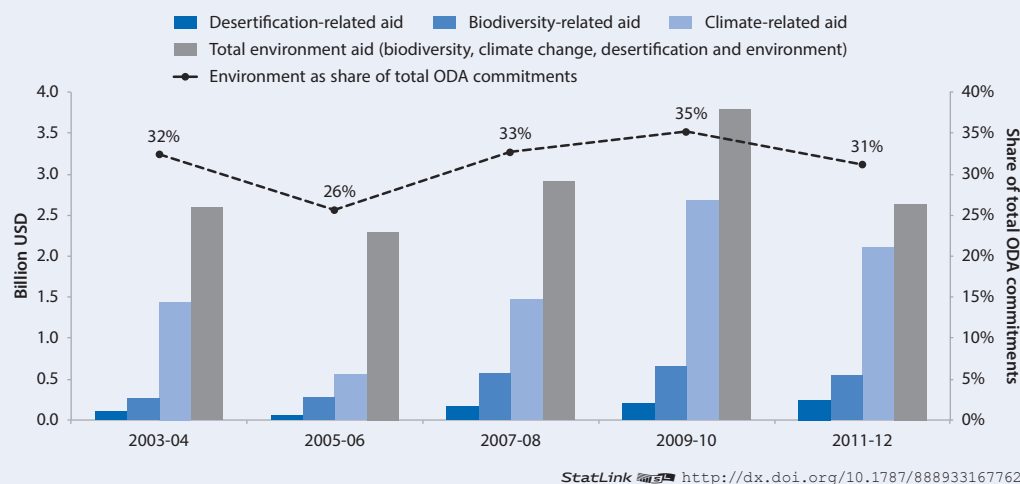
Box 1.2. How is official development assistance supporting green growth? (continued)

However, the scope for further increases in the near term may be somewhat limited. Indicative forward spending surveys suggest that ODA as a whole will grow slowly at best over the coming years in the face of the current financial crisis and large fiscal constraints in provider countries (OECD, 2013d); environmentally-targeted ODA is also likely to level off in the near future.

The figure below shows that between 2002-03 and 2009-10 ODA commitments to environmental objectives in Southeast Asian countries increased from about USD 2.5 billion to more than USD 3.5 billion, to reach more than 35% of total ODA commitments. Yet during 2011-12, ODA commitments both to the environment and in total decreased markedly, consistent with the overall trend in ODA commitment flows in other regions of the world.

Growth is slowing in ODA bilateral support to environmental objectives in Southeast Asia

Two-year annual averages, Billion USD, constant 2012 prices



Note: Countries considered are Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand and Viet Nam. Development co-operation activities can target more than one environmental policy objective simultaneously; to reflect this, the OECD DAC CRS allows activities to be tagged with more than one environmental policy marker, allowing multiple objectives to be tracked, while identifying overlaps to ensure that development co-operation is not counted twice. The “total environmental aid” bar is the sum of the development co-operation targeting biodiversity, climate change adaptation, climate change mitigation, desertification, and local environmental objectives, netting out any overlaps. For more information, see www.oecd.org/dac/stats/rioconventions.htm.

Source: OECD Development Assistance Committee Creditor Reporting System data, <http://stats.oecd.org/index.aspx?DataSetCode=CRS1>, accessed July 2014.

* Official development co-operation can reach partner countries through bilateral or multilateral delivery systems. Bilateral refers to government-to-government transfers.

In the least developed Southeast Asian countries, ODA can support the green growth agenda by targeting a variety of environmental objectives, such as biodiversity, desertification and climate change and other environmentally related areas. These are often characterised by a dearth of private investment, either because of lack of incentives or underdeveloped financial markets.

Well-designed environmental tax reforms can yield multiple benefits

Environmental tax reforms aim at shifting taxation away from labour, income and capital to resource consumption and pollution, while leaving total tax revenue unchanged. Well-designed tax reforms can yield multiple dividends, including sustained economic growth and more jobs, thanks to a less distortive tax system, greater resource efficiency and lower pollution. In addition, environmental tax reforms can directly contribute to alleviating the environmental problems – such as water contamination and air pollution – which affect the poor most. They can also indirectly promote poverty alleviation by generating or freeing up resources for anti-poverty programmes in such areas as water supply and sanitation, or for pro-poor investments such as health and education (OECD, 2005). In designing environmental tax reforms, countries should strive for the broadest possible tax base. Tax bases with few or no exemptions ensure cost-efficient emission reductions and may allow for lower statutory tax rates. They might also facilitate the acceptance of environmental tax reforms by all affected parties (OECD, 2006).

Reducing absolute poverty is still an important policy objective in many Southeast Asian countries. To be socially and politically acceptable, environmental tax reforms must be consistent with poverty reduction strategies. Implementing social policies alongside tax reforms can shield the poor from any adverse impacts. Such policies can include block utility tariffs for the poorest (also known as “lifeline tariffs”), a more progressive income and labour taxation system, and temporary increases in cash transfer programmes. For instance, Indonesia and Malaysia recently implemented cash transfer programmes to compensate people for the partial removal of fossil fuel subsidies (IEA, 2013c; Bridel and Lontoh, 2014; Beaton and Lontoh, 2010).

Environmental tax reforms will not undermine national competitiveness provided that reductions in other taxes compensate for any increases in environmental taxes. This is confirmed by evidence from European countries which have already implemented limited environmental tax reforms – such as Denmark, Finland, Germany, the Netherlands, Sweden and the United Kingdom (Ekins and Speck, 2010; Ekins and Speck, 2011).


Environmental tax reforms can, however, undermine the competitiveness of some specific sectors and firms (those relying intensively on resource exploitation or highly polluting technologies) by raising costs. The empirical evidence suggests that these negative effects on some sectors and firms can be offset by the positive effects on others, stemming for instance from resource and energy efficiency improvements, more innovation and higher employment (e.g. Ekins and Speck, 2010). Flexible labour and product markets are key for these offsets to work: resources and labour will need to shift from the highly-polluting and more resource-intensive sectors to those which are less polluting and resource-intensive. One lesson from the OECD experience with environmental tax reforms is that policy makers should ensure that competitiveness issues are adequately assessed and communicated to the business communities and the public (OECD, 2006).

Model simulations by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) for three ASEAN countries (plus China, India, Japan and Korea) suggest that environmental tax reforms could lead to substantially lower CO₂ emissions, with only a

small impact on GDP and employment (Table 1.3). Using a computable general equilibrium model, the researchers simulated the effect on GDP and employment by 2020 of the introduction of a carbon tax of USD 10 per tonne of CO₂. The simulation was run under different scenarios depending on how the revenues from the carbon tax were used. The results show that if environmental tax revenues were not used to reduce other taxes (the worst-case scenarios in the table), the carbon tax would result in a slight contraction of GDP and employment. The effect on the economy would be positive if the tax revenue was used to reduce other taxes, especially corporate income taxes. Overall, this suggests that well-designed reforms, in conjunction with other structural policies to boost competition and innovation, could help some Southeast Asian countries to escape the middle-income trap and achieve high-income status.

Table 1.3. **Well-designed environmental tax reforms can have positive impacts**

	CO ₂ reduction (%) worst case; best case	GDP impacts (%) worst case; best case	Employment (%) worst case; best case
Cambodia	-10.86; -8.60	-0.39; +1.01	-0.27; +0.26
Malaysia	-9.36; -7.24	-0.82; +1.45	-0.52; +0.42
Thailand	-6.79; -3.81	-0.81; +1.57	-0.37; +0.54
China	-21.11; -15.59	-1.85; +1.90	-0.44; +0.67
India	-17.77; -15.04	-0.94; +0.62	-0.32; +0.32
Japan	-3.01; -2.78	+0.03; +0.21	-0.03; +0.04
Republic of Korea	-8.64; -7.30	-0.22; +0.73	-0.13; +0.08

StatLink  <http://dx.doi.org/10.1787/888933168228>

Note: Values range from worst-case scenario to best-case scenario (except for CO₂ emission reductions where the inverse is presented), based on how the revenues from the tax are used.

Source: Park, S.-J., M. Yamazaki and S. Takeda (2012), “Environmental tax reform for low carbon green growth: major findings and policy implications from a multi-regional economic simulation analysis”, presentation at the *East Asia Low Carbon Green Growth Roadmap Forum*, 25-26 April 2012, Seoul, Republic of Korea.

In the least developed ASEAN countries, a share of the proceeds from environmental taxes could be allocated to environmentally-related monitoring and enforcement activities. While earmarking tax revenues to specific purposes is generally not advisable,⁹ where environmental agencies are poorly resourced or heavily dependent on development co-operation assistance, as in developing Southeast Asian countries, earmarking can provide a predictable source of financing for environmental monitoring and enforcement. This in turn strengthens the contribution of environmental tax reform to the green growth transition (OECD, 2005), as well as to the social and political acceptability of the tax reform.

Some Southeast Asian countries have already introduced, or are considering, some comprehensive environmental tax reforms (UNESCAP, 2012). For example:

- Thailand has been considering a law to promote green growth, which would involve several economic instruments, including elements of environmental tax reform. The draft Economic Instruments for Environmental Management Act considers a range of economic instruments, including environmental taxes, user fees and charges for pollution management, product surcharge, performance bonds, tradable permits, subsidies and other support mechanisms and allows product prices to include end-of-life management fees. The Pollution Management Plan (2012-16) also aims at applying the polluter pays principle widely (Nuntapotidech, 2012). Most of the laws and regulations to implement these instruments still need to be passed, however.

- Viet Nam’s Environmental Protection Tax Law entered into force in 2012. The law targets a diverse list of pollutants including fossil fuels, hydrochlorofluorocarbons, plastic bags, and harmful herbicides, pesticides and forest products whose use is restricted. Importantly, taxes are applied at the source – those organisations and individuals producing or importing the goods. Tax rates vary according to the goods taxed and the environmental damage they cause.

While these are steps in the right direction, their scope is still limited and tax rates are sometimes too low. Countries in Southeast Asia should keep pursuing these reforms, ideally in a co-ordinated fashion so as to increase peer pressure for reform and better manage competitiveness issues in a regional context. The OECD’s *Environmental Fiscal Reform for Poverty Reduction* (OECD, 2005) provides guidance on the role of international development co-operation agencies in supporting environmental tax reforms in developing countries (Box 1.3).

Box 1.3. How can development co-operation providers contribute to environmental tax reforms?

The environmental tax reform policy cycle involves a number of linked and often overlapping phases. Development co-operation providers can play important roles at each stage:

a) Agenda setting stage: reform must start with a clear identification and sound understanding of the issue to be tackled, including notably its impact and causes and its relative importance in view of the many issues facing a country.

What development co-operation providers can do: support knowledge sharing and capacity building through conferences and round tables, as well as the work of universities, research groups and international organisations.

b) Policy development stage: This involves an assessment of the mix of instruments which could be used, identifying the potential “winners” and “losers” from reform and possible compensatory measures.

What development co-operation providers can do: encourage integrated, cross-sectoral policy reforms in relation to environmental tax reform. Providers can also help those sectors of government (such as finance or environment ministries) who favour reform to overcome bureaucratic inertia or resistance from “hostile” ministries or agencies. They can also encourage transparency, access to information on public finances, public participation and accountability – key preconditions for sound policy development and good governance. They can support capacity development, notably in the relation to the measurement of implicit taxes and subsidies and the quantification of impacts.

c) Dialogue, information dissemination and advocacy stage: Securing political acceptance and public support for environmental tax reform often requires active advocacy, including through public awareness campaigns.

What development co-operation providers can do: contribute to such dialogues and awareness-raising activities, including through support to civil society groups. They can also support international sharing of experience and dialogue on environmental tax reform among developing country governments, international organisations and NGOs. Examples of this include current initiatives, for example, on the transparency of extractive industries (Extractive Industries Transparency Initiative – EITI) and illegal logging (Forest Law Enforcement Governance and Trade Process – FLEGT).

Box 1.3. How can development co-operation providers contribute to environmental tax reforms? *(continued)*

d) Implementation stage: Implementation generally starts with a public announcement of upcoming reforms preferably early on. It is important to give affected parties the time to prepare and adapt to the proposed changes. Gradual phasing-in of reforms is another way to reduce the transition costs, although it may increase the risks of loss of momentum.

What development co-operation providers can do: help to finance the transitional costs of reform, in order to protect the poor from negative impacts or to overcome politically powerful blockages.

e) Building the credibility of monitoring and enforcement agencies: Credibility is essential to sustain support for reform, and confront challenges. This includes, for example, resistance from affected industries which have direct interests in portraying the environmental monitoring and enforcement agency as unprofessional, corrupt, or abusive. Environmental agencies must also be credible vis-à-vis ministries of finance. This includes, in particular, conforming to rules and principles of public expenditure management. The capacity of fiscal authorities to collect and administer existing taxes (including compliance monitoring and enforcement) may also need to be enhanced for proposals for fiscal reforms to be credible.

What development co-operation providers can do: provide technical assistance to develop partners' capacity in all these areas. In the case of natural resources, this may include the formulation of new management regimes as well as the formalisation and registration of property rights.

Source: OECD (2005).

Removing fossil fuel energy subsidies is integral to green growth

Removing fossil fuel energy subsidies is an integral part of environmental tax reforms and green growth strategies. Fossil fuel subsidies were introduced in Southeast Asia, as in other emerging economies, as a way to help the poorest households. Energy subsidies reduce households' energy bills and firms' energy costs and therefore consumer prices, thereby boosting households' purchasing power. However, in practice such subsidies have often proved to be highly inefficient for redistributing wealth and reducing inequalities as they cannot specifically target poor households. Energy subsidies largely apply to energy sources which poor households either do not consume – such as gasoline – or do not have access to – such as electricity; therefore a large share of the subsidy benefits the better off.

By raising the relative prices of fossil fuels compared to renewable energy sources, the removal of fossil fuel subsidies will help to bring more renewable sources into the energy mix, thus helping to lower CO₂ emissions and other air pollutants. Furthermore, the removal of these distortive fossil fuel subsidies will improve economic efficiency and result in higher economic growth.

In Southeast Asia, subsidies to fossil fuel are high and represent a significant share of the public budget. In 2012, they amounted to about USD 51 billion (IEA, 2013a), equivalent to 11% of all general government spending in the region. Indonesia, Thailand and Malaysia have the largest fossil fuel subsidy programmes, with fossil fuel consumption subsidies amounting to about USD 25, 10 and 7 billion respectively in 2012. Removing them is therefore urgent. Doing so however will require setting up compensatory mechanisms to help the poor.

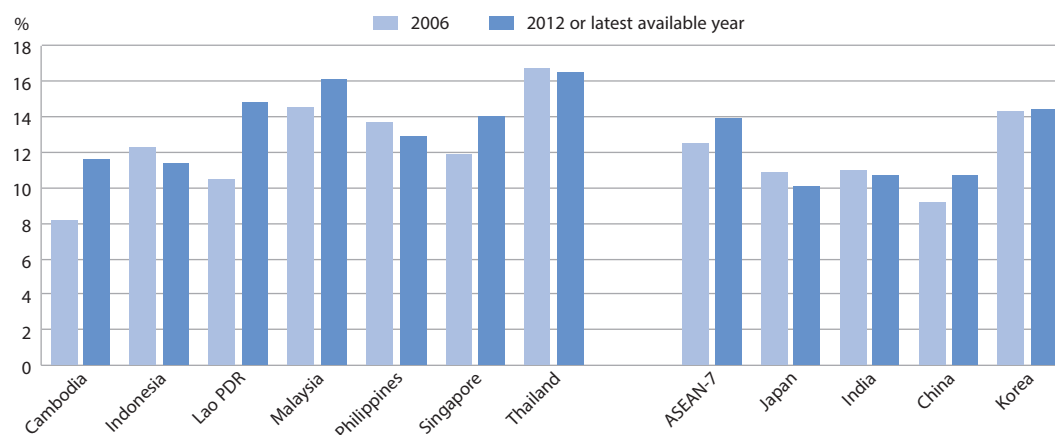
A forthcoming OECD study simulates the economic and distributional impacts of gradually phasing out all energy consumption subsidies in Indonesia between 2012 and 2020 (Durand-Lasserve et al., forthcoming). The analysis indicates that the removal of energy subsidies would generate a permanent real GDP gain of between 0.4% and 0.7% by 2020 when implemented alongside a cash transfer programme to compensate the poor. This case makes it clear that compensating the poor for the removal of subsidies is of the utmost importance in ensuring the reform increases rather than reduces the purchasing power of the poor (Mourougane, 2010; Durand-Lasserve et al., forthcoming). Without compensation, the removal of energy subsidies would worsen inequalities and would likely meet with strong political and social opposition. Importantly, the analysis also shows that phasing out energy subsidies would reduce Indonesian greenhouse gas (GHG) emissions by between 7.9% and 8.3% and CO₂ emissions from fuel combustion by between 10.8% and 12.6% by 2020. Although not quantified in the study, other environmental co-benefits associated with phasing out energy subsidies can be expected, such as improvements in air quality, thus contributing to further increasing social welfare.

Low and inefficient tax collection systems are an obstacle to green growth

Tax systems in Southeast Asia are generally underperforming. The tax revenue-to-GDP ratio is less than 20% in seven ASEAN countries (Figure 1.11), lower than the OECD average of around 35%. This low ratio is mainly explained by two factors: tax policy choices and poor compliance.

Southeast Asian countries tend to provide numerous tax exemptions to businesses and individuals. These are often motivated by a variety of concerns, such as reducing poverty and protecting fledgling industry. For instance, in the Philippines and Indonesia, value added tax (VAT) revenues are only about 20% and 56%, respectively, of the amount that could potentially be collected if the numerous exemptions and preferential rates granted to certain sectors and goods were repealed.¹⁰ In addition, a number of taxes are

Figure 1.11. Tax revenue-to-GDP ratios are low in Southeast Asia
Percentage of GDP



StatLink <http://dx.doi.org/10.1787/888933167770>

Note: Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. ASEAN-7 is the arithmetic average of the countries appearing on the left side of the figure.

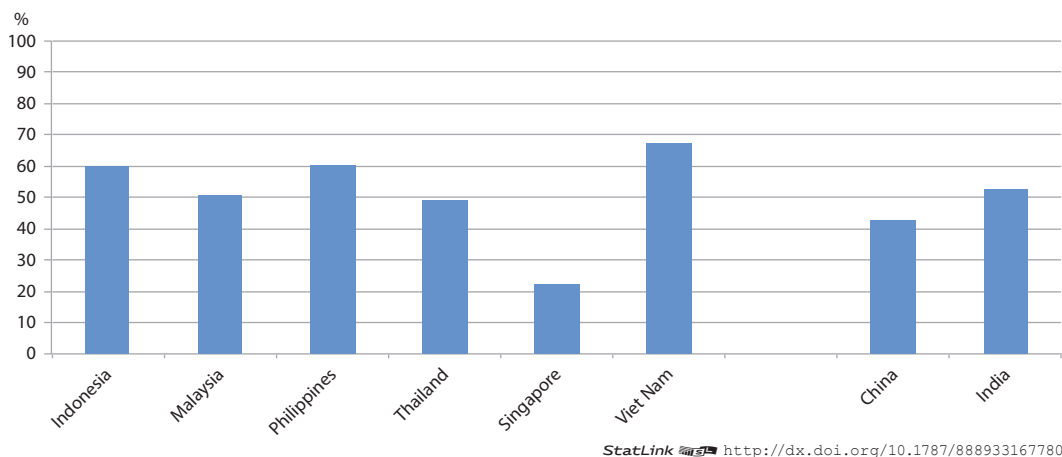
Source: Authors' calculations based on International Monetary Fund (2014), *Government Finance Statistics Yearbook, 2014*, IMF, Washington, DC.

relatively under-used in many countries in Southeast Asia, such as real estate taxes and environmental taxes. Personal income taxes are also generally less important than in OECD countries because of lower personal income levels (IMF, 2011; OECD, 2013c).

The collection of tax revenues in Southeast Asia is also hampered by inefficiencies in the tax system and weak law enforcement. In addition, the large amount of economic activity carried out in the informal sector in some of ASEAN countries facilitates tax evasion and smuggling.

The “tax effort” provides a rough gauge of the efficiency of the tax system. It is the ratio between the actual tax revenues and the theoretical maximum that could be collected if statutory rates were applied uniformly. According to this measure, tax effort is lowest in Singapore and highest in Viet Nam (Figure 1.12). All ratios (except for Viet Nam) are below the global median of the income group to which the countries belong (OECD, 2013c).

Figure 1.12. Tax effort varies in Southeast Asia, China and India



Note: The tax effort is computed as the ratio between the actual tax revenues and the theoretical maximum that could be collected if statutory rates were applied uniformly with no exception.

Source: OECD (2013c), *Southeast Asian Economic Outlook 2013: With Perspectives on China and India*, OECD Publishing, <http://dx.doi.org/10.1787/sao-2013-en>.

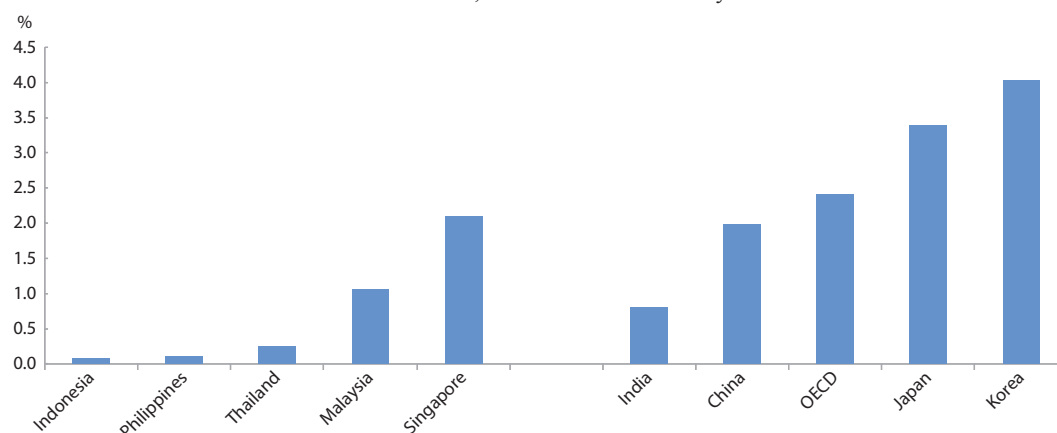
Improving tax collection systems is an important step for implementing green growth strategies. More specifically, the environmental tax reforms described above depend on effective tax collection agencies capable of enforcing laws and regulations. Furthermore, raising the tax revenue-to-GDP ratio would allow Southeast Asian governments to expand the social safety net and increase investment in infrastructure, thus helping to deal with the unequal effects green growth policies can have on firms and households.


Innovation rates will need to increase

Innovation is key to accelerating the transition to greener growth. Many of the framework conditions promoting or hindering green innovation are the same as for other types of innovation. Previous OECD work has confirmed that green innovation thrives in a sound environment for overall innovation. However, innovation policies should not be seen in isolation. Other factors – notably the environmental policy-setting framework – determine the incentives and rewards for green innovation and therefore drive the speed and pattern of green innovation (OECD, 2011a).

Spending on research and development (R&D) suggests that general innovation rates have increased recently in the ASEAN, but remain low by world standards (Figure 1.13). Malaysia, Thailand and Viet Nam have the highest R&D spending as a share of GDP in Southeast Asia, while Indonesia, Lao PDR and Cambodia have the lowest. In Malaysia and the Philippines, the business sector is the main driver of R&D spending, whereas the public sector is more prominent in other parts of the region. Another proxy for innovation – the growth in the number of scientific publications – has outstripped global growth rates and quality has improved, but important disparities exist across countries (OECD, 2013e).

Figure 1.13. **ASEAN R&D spending could be higher**
Percent of GDP, 2012 or latest available year



StatLink  <http://dx.doi.org/10.1787/888933167797>

Note: Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.

Source: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed June 2014.

Shallow financial markets, the lack of a qualified workforce and weak competitive pressures can all explain the low levels of R&D spending in Southeast Asia. In addition, while intellectual property rights legislation is generally in line with international practice, it is often not properly enforced. The fact that small and medium enterprises form the backbone of ASEAN countries' production and service sector poses additional challenges as such enterprises often face more stringent financing constraints and lack knowledge networks, which hamper their innovation efforts.

In this context, policies to improve access to finance and information, foster knowledge-exchanging platforms and support skills development could all help to raise innovation rates in ASEAN countries. However, promoting green innovation will require additional policies, such as a predictable system of taxes and subsidies to incorporate pollution costs into market prices and foster a demand for greener technologies.

Policies can also stimulate markets for green products and services and thus foster innovation. Green public procurement, for example, has the double benefit of greening governments and providing a financing source for the production and deployment of green goods and services that markets may not offer, especially at the early stages of new green technology.

However, the implementation of green public procurement strategies must not be at the expense of competition, transparency and accountability. Standards and ecolabels are needed so as to identify products which meet the required “green” criteria. There also have to be enough competitive products meeting those criteria to ensure fair and competitive bidding processes in fulfilling governments’ numerous needs (UNEP, 2013).

Southeast Asian countries have started adopting green public procurement. One common challenge is a lack of standards and ecolabels, which are gradually being developed, and the number of products certified. For instance, Thailand has been gradually implementing green public procurement since 2005 and is now in the process of defining product groups with additional CO₂ emission reduction criteria. Malaysia started a Green Procurement Public Programme and eco-labelling in 2010. These initiatives should be continued and eco-labelling further extended.

Effective competition is necessary to unleash productivity growth and green innovation

Removing barriers to entrepreneurship, trade and investment and the enforcement of competition law are important for green growth. In addition to increasing overall economic efficiency, they can be instrumental in stimulating green innovation:

- Opening up markets to global competition may reduce inefficiencies, while also encouraging firms to innovate and increase further their productivity (Nicoletti and Scarpetta, 2003).
- If market prices take into account negative environmental externalities, competitive pressures provide powerful incentives to generate and adopt green innovations. However, in some cases, the adoption of green technologies may be hindered by barriers to competition that do not apply to traditional technologies. For example, many countries have designed network regulations for the electricity sector without considering the intermittent generation characteristic of some renewable energy sources. Market rules built around such regulations can then unintentionally exclude renewable power generators from the market, or increase their costs unnecessarily.¹¹ Such regulations need to be revised so as to enable a broad penetration of renewable generation in a competitive market system (OECD, 2011a).

Competitive pressures vary greatly across ASEAN countries. According to the World Bank’s *Doing Business* report, Singapore ranks first in the world for its ease of doing business because it is very easy to start a business, obtain a construction permit and trade across borders (World Bank, 2013). In contrast, Brunei Darussalam, the Philippines, Indonesia and Viet Nam are at the bottom of the ranking. There are also many barriers to cross-border trade in Cambodia and Lao PDR (Table 1.4). The number of new businesses in relation to the working age population confirms this picture (Figure 1.14). According to this measure, Singapore, and to a lesser extent Malaysia, have high rates of business creation and are close to top-performing countries such as New Zealand, Iceland and the United Kingdom. By contrast, the intensity with which new companies are created is extremely low in other ASEAN countries, despite slightly increasing since the early 2000s (except for the Philippines). Reducing red tape and simplifying administrative procedures would be a step forward in making the economy more dynamic, encouraging entrepreneurship and boosting innovation and the deployment of new technologies.


Competition policies are important to prevent the abuse of market power. Market power reduces competitive pressure and output and results in higher prices. In developing countries

where institutions are weak, it is difficult to implement competition policies effectively. Yet, with progress in economic development and improving institutional building capacity, creating an effective competition policy framework is crucial for sustaining economic growth.

ASEAN countries intend to introduce national competition policies by 2015 as part of the project to establish the ASEAN Economic Community by the same year. However,

Table 1.4. **Barriers to entrepreneurship, trade and investment ASEAN countries**
Indicators, 2013

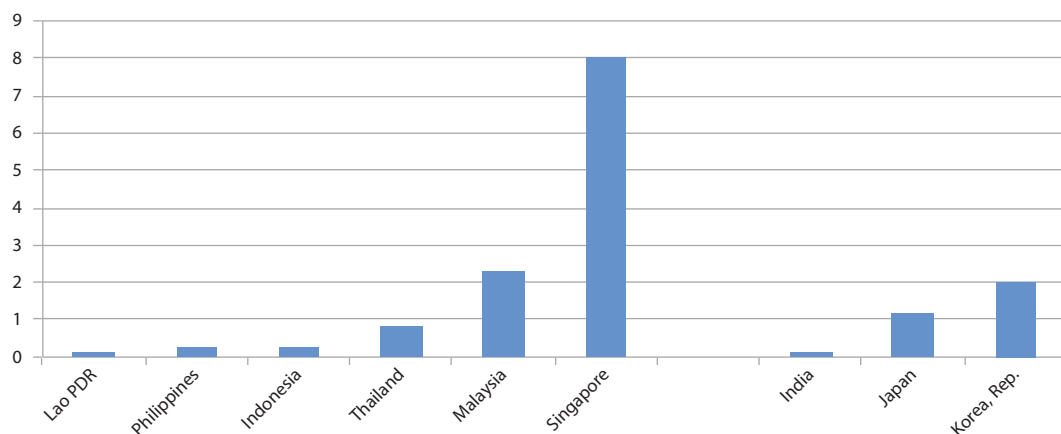
	Ease of doing business	Starting a business	Dealing with construction permits	Getting electricity	Registering property	Getting credit	Protecting investors	Paying taxes	Trading across borders	Enforcing contracts	Resolving insolvency
Brunei Darussalam	59	137	46	29	116	55	115	20	39	161	48
Cambodia	137	184	161	134	118	42	80	65	114	162	163
Indonesia	120	175	88	121	101	86	52	137	54	147	144
Lao PDR	159	85	96	140	76	159	187	119	161	104	189
Malaysia	6	16	43	21	35	1	4	36	5	30	42
Myanmar	182	189	150	126	154	170	182	107	113	188	155
Philippines	108	170	99	33	121	86	128	131	42	114	100
Singapore	1	3	3	6	28	3	2	5	1	12	4
Thailand	18	91	14	12	29	73	12	70	24	22	58
Viet Nam	99	109	29	156	51	42	157	149	65	46	149


StatLink  <http://dx.doi.org/10.1787/888933168238>

Note: Low numbers mean low barriers. Economies are ranked from 1 to 189. A high ranking (i.e. low number) means the regulatory environment is more conducive to the starting and operation of a local firm.

Source: Authors' calculations based on World Bank Doing Business (website), www.doingbusiness.org/rankings, accessed August 2014.

Figure 1.14. **The density of start-up businesses could be increased**
2012



StatLink  <http://dx.doi.org/10.1787/888933167804>

Note: Start-up business density is defined as the number of newly registered corporations for every 1 000 working-age people (those aged 15-64); the units of measurement are private, formal sector companies with limited liability.

Source: Authors' calculations based on World Bank Entrepreneurship Database, www.doingbusiness.org/data/exploretopics/entrepreneurship, accessed August 2014.

progress has been slow and only five ASEAN countries (Indonesia, Malaysia, Singapore, Thailand and Viet Nam) have so far introduced competition policies. The Philippines has instead established a competition authority with the remit of implementing competition-related laws. Nevertheless, there are stark differences among those countries that have already introduced competition policies in how they are applied and enforced (Box 1.4).

Box 1.4. Competition policies in ASEAN countries

The competition framework in those ASEAN countries that have introduced generic competition laws and policies is very diverse:

Malaysia: The Malaysian Competition Act was passed by the Malaysian Parliament in 2010 and came into force in 2012. It prohibits anti-competitive activities and abuses of dominance. It does not, however, govern mergers and acquisitions. The Malaysian Competition Act applies to any commercial activity, both within Malaysia and transacted outside Malaysia, that has an effect on competition in any market in Malaysia. Commercial activity regulated under the Communications and Multimedia Act 1998 and the Energy Commission Act 2001 is not subject to the Malaysian Competition Act.

Thailand: The Trade Competition Act was passed in 1999. It is the principal legislation governing anti-competitive agreements, abuse of dominance, mergers and other unfair trade practices in Thailand. The Thai Competition Act co-exists with several sectoral laws that regulate competition in certain industries. The Trade Competition Commission (TCC), which is a part of the Ministry of Commerce, is the main regulator responsible for enforcing the Thai Competition Act. The TCC and the sectoral regulatory authorities may have concurrent or overlapping powers in anti-competitive conduct, mergers and monopolies. The relevant statutes or regulations are not always clear on which authority will be the enforcing authority in case of an overlap. From a transactional perspective, it is necessary to review the powers of the relevant sectoral authorities and the TCC in order to determine which regulator has the power to regulate an action, conduct or agreement in a particular industry.

Viet Nam: The Law of Competition is the main legislation governing competition law in Viet Nam. The two regulators in charge of regulating competition are the Viet Nam Competition Administration Department (VCAD) which falls under the Ministry of Industry and Trade, and the Viet Nam Competition Council (VCC). The Viet Nam Competition Act co-exists with a number of sectoral laws that regulate competition in certain industries. Thus in addition to the VCC and VCAD, the designated sectoral regulators also have concurrent jurisdiction in regulating certain sectors.

Indonesia: The Prohibition of Monopoly and Unfair Business Competition Practices Law was introduced in 1999 and entered into force in 2000. The national competition agency – known as KPPU – regulates competition law. The law applies to any individual or entity engaging in business or commercial activities.

Singapore: The Competition Act (Singapore Competition Act) is the main act regulating competition law in Singapore. The act prohibits anti-competitive agreements, decisions and practices; the abuse of dominant position; and mergers and acquisitions that substantially lessen competition. The Competition Commission of Singapore (CCS) is the main competition law regulator in Singapore and is a statutory board under the Ministry of Trade and Industry. CCS has also released 13 sets of guidelines which provide useful explanations as to how CCS interprets, administers and enforces the Singapore Competition Act. Although CCS is the only regulator which administers and enforces the Singapore Competition Act, the sectoral laws are administered and enforced by sectoral regulators.

Source: Sigham, G. and S. Hariharan (2012).

To enhance the region's competition framework, the focus should be on implementing competition policies and laws in those countries which have none. Since the least developed ASEAN countries may not have the resources or capacity to establish effective competition frameworks, the ASEAN Experts Group on Competition was established in 2007 to provide assistance, training and the sharing of experiences on competition-related matters. Its activities should be strengthened further. Both formal and informal channels for the exchange of information among competition authorities will also become more important as ASEAN economies become more integrated with each other (Lee and Fukunaga, 2013).

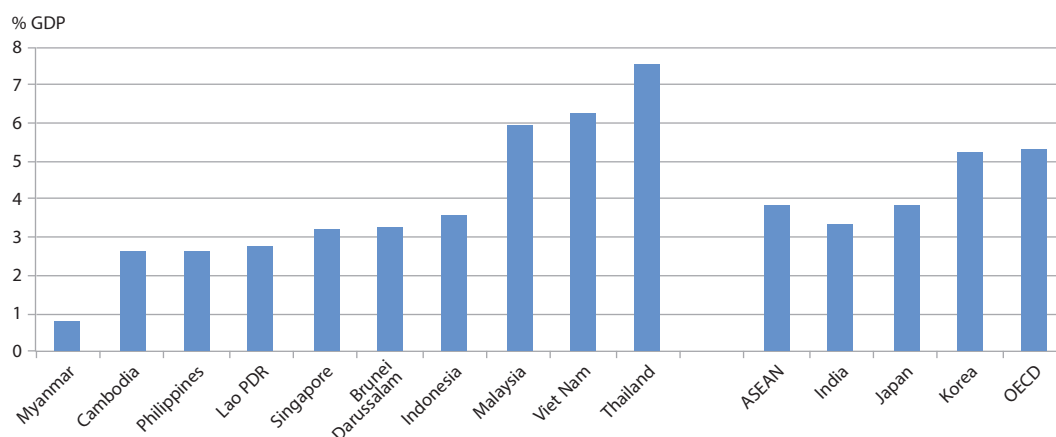
The education system and the quality of the workforce should be strengthened


Education is a very important driver of long-term economic growth. The first channel through which education promotes growth is by enhancing the human capital and skills of the labour force, which increases labour productivity. Education also improves an economy's innovative capacity and the diffusion and transmission of knowledge required to apply new technologies (Hanushek and Wössmann, 2010).

Figure 1.15 shows the large disparities among education systems in ASEAN countries. Some countries – such as Myanmar – spend less than 1% of their GDP on public education, whereas education spending in Viet Nam and Malaysia is much higher. Literacy rates for adults are now above 90% in all countries except Cambodia and Lao PDR (OECD, 2013f). ASEAN economies have devoted an increasing share of public spending to education and enrolment rates have markedly improved over the years. There is much more heterogeneity in pre-primary and post-primary education enrolments, even when under-age and over-age students are taken into account (Figure 1.16). Enrolment rates in tertiary education are strikingly low in many of the countries, especially when compared to their developed regional peers (Korea and Japan). This can be a barrier to highly innovative activities and long-term economic growth.

Figure 1.15. **Public spending on education is generally low in ASEAN countries**

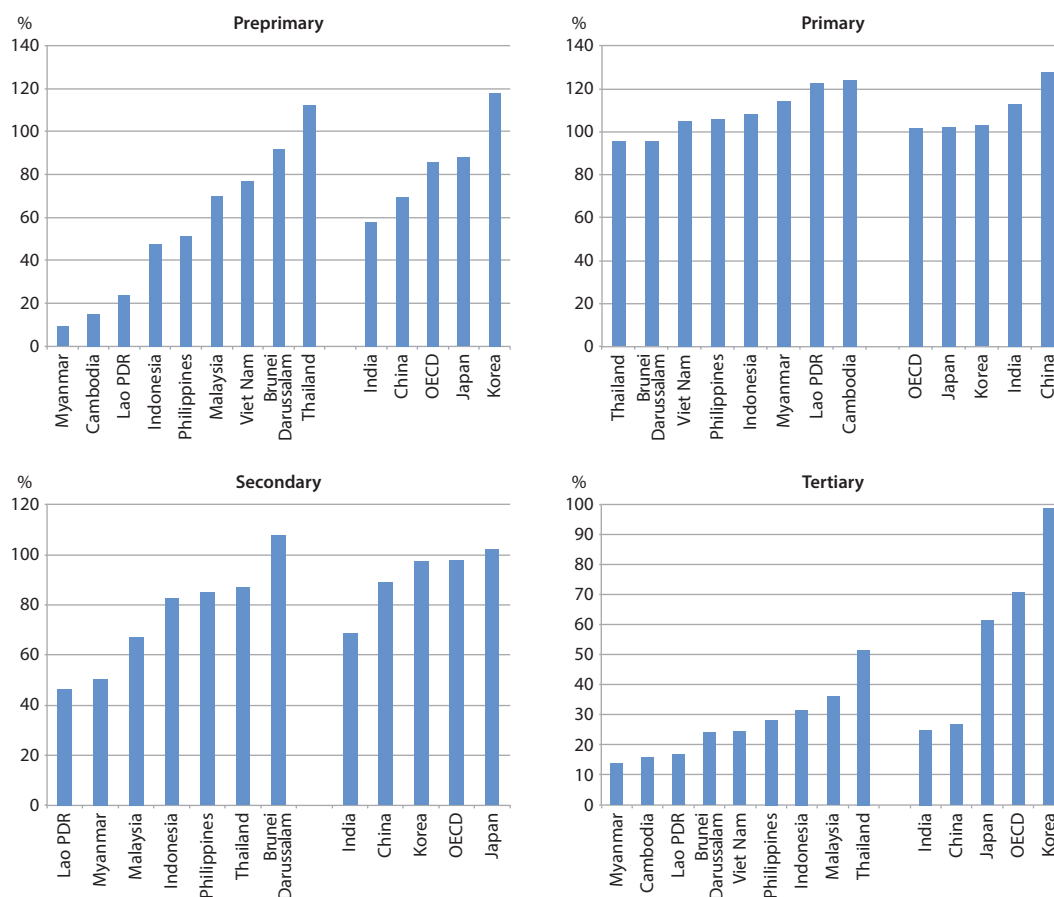
2012 or latest available year



StatLink  <http://dx.doi.org/10.1787/888933167815>

Source: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed June 2014.

Figure 1.16. **Tertiary education enrolment rates could be improved**
2012 or latest available year



StatLink <http://dx.doi.org/10.1787/888933167823>

Note: Gross enrolment rates may exceed 100% because they represent the total number of students currently enrolled in a particular category of education as a share of the total number of students officially corresponding to that education category. Therefore they include students who are under-age or over-age.

Source: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed June 2014.

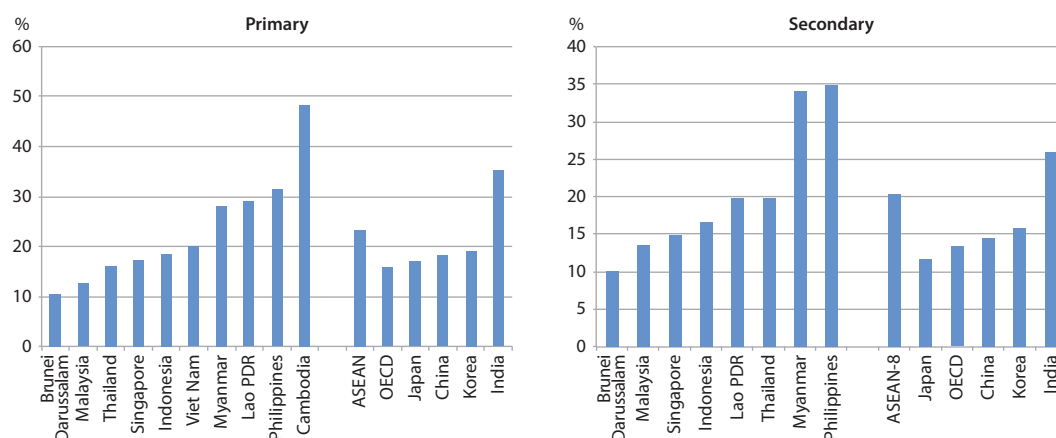
Recent empirical studies support the view that the quality of education is a more important determinant of economic growth than its quantity, usually measured by the number of years of formal education. The quality of education is directly related to the development of non-cognitive skills (Hanushek and Wössmann, 2010; Gertler et al., 2013). Pre-primary education is the best time to start developing non-cognitive skills. Yet, enrolment rates in pre-primary educational are close to zero in Lao PDR, Myanmar and Cambodia. Using the pupil-to-teacher ratio as an indicator of the quality of primary and secondary education reveals very large average class sizes in the least developed ASEAN countries (Figure 1.17). By contrast, small classes in other countries (Brunei Darussalam, Malaysia and Indonesia) facilitate more focused and targeted teaching.

An effective education and training system is the cornerstone of building the new skills required of a greener economy (OECD, 2012c; 2011a). Recent OECD work on *Greener Skills and Jobs* (OECD/Cedefop, 2014) underlines how developing “green” skills is also part of a broader challenge to increase the capabilities of small and medium-sized enterprises

to thrive in a green growth development model. This is all the more urgent in ASEAN countries, where most of the workforce is employed by small firms, often operating in the informal sector and offering little or no training opportunities. A shift towards green growth will put pressure on education and training systems to provide such new skills.

Figure 1.17. **High pupil-to-teacher ratios in some ASEAN countries**

2012 or latest available year



StatLink <http://dx.doi.org/10.1787/888933167836>

Note: ASEAN-8 is the arithmetic average of the countries appearing on the left side of the figure. ASEAN refers to all 10 ASEAN member countries.

Source: Authors' calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed June 2014.

Skills shortages in ASEAN countries are likely to obstruct the implementation of green growth strategies and the creation of “green” jobs. Except in Malaysia, the percentage of skilled workers in the total is very low – rarely exceeding 20% or even 10% (Martinez-Fernandez and Cho, 2012b). Low-skilled workers represent the bulk of the workforce in Viet Nam and the Philippines. In this context, it will be important to upgrade and develop new skills to facilitate a smooth shift to greener technologies.

Labour market informality needs to be reduced

One characteristic of ASEAN countries is the large size of the informal sector (Table 1.5). To some extent, this reflects the predominant role played by small firms in these countries' production structure. Such firms are the major source of employment (50 to 95% of employment). The main consequence of such widespread informality, however, is that most workers and firms are not subject to regulations and laws.


Large labour market informality presents a challenge for green growth policies for several reasons. First, informal workers are generally outside the social safety net and therefore may not benefit from those social policies governments could implement to mitigate the distributional effects of green growth policies. Second, they lack training opportunities, making the transition to other sectors of the economy more difficult.

The flexibility of the formal labour market is another important issue. A flexible labour market can enable the transition of workers to those sectors poised to expand due to green growth policies. ASEAN countries vary significantly in the rigidity of their formal labour markets. For instance, while Cambodia and Thailand have fairly open labour markets,

formal labour markets in Indonesia are characterised by strong employment protection, with excessive dismissal procedures and onerous severance payments (OECD, 2012d). Although those labour laws are not always enforced as a large portion of small firms are not registered, such restrictive rules discourage formalisation and could impede a smooth transition to a greener economy. Increasing formalisation of a flexible labour market will accelerate the transition by making it easier for employees to shift from declining to expanding sectors and firms and to provide training for the labour force (OECD, 2011a).

Table 1.5. **The informal employment sector is large**
Percent of non-agricultural employment

	Persons employed in the informal sector ^a	Persons in informal employment outside the informal sector ^b	Total informal employment ^c
China (2010)	21.9	12.5	32.6
Indonesia (2009)	60.2	12.2	72.5
Philippines (2008)	72.5	11.5	70.1
Thailand (2010)	-	-	42.3
Viet Nam (2009)	43.5	25	68.2

StatLink  <http://dx.doi.org/10.1787/888933168248>

Notes: a. Employment in the informal sector, including formal employment (if any) in the informal sector, i.e. employees holding formal jobs in informal enterprises.

b. Informal employment outside the informal sector, i.e. employees holding informal jobs in formal enterprises (incl. government units and non-profit-institutions), as paid domestic workers employed by households, or as contributing family workers in formal enterprises.

c. Total informal employment, excluding employees with formal jobs in informal enterprises.

Source: International Labour Organization (2014), Laborsta Internet, “Women and men in the informal economy – Statistical picture” (website), http://laborsta.ilo.org/informal_economy_E.html, accessed January 2014.

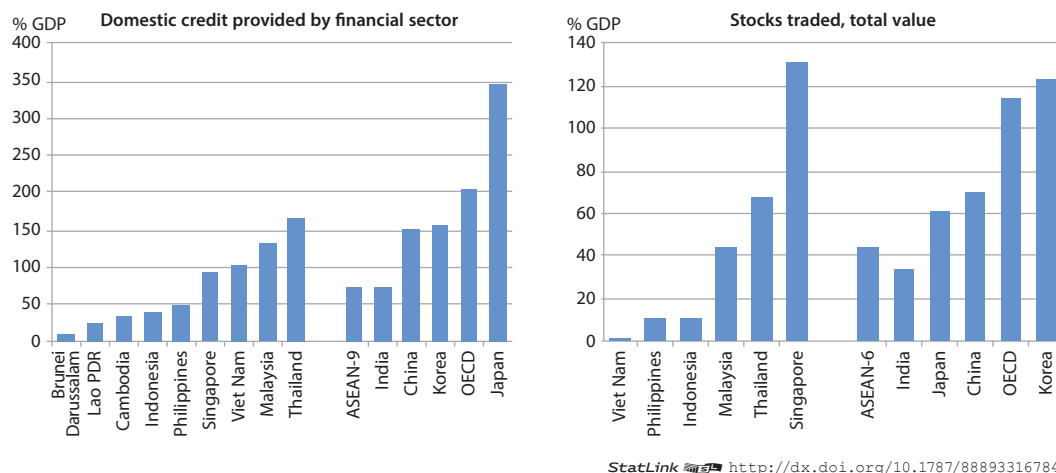
Financial deepening will support investment and innovation

Well-functioning financial markets are important for economic growth and also to finance private investment in green growth. Theory suggests that a more developed and well-regulated financial sector reduces information and transaction costs, thus supporting long-term economic growth (Levine, 2004).

Following the 1997-98 Asian financial crisis, the region underwent a major overhaul of its financial markets. Most countries have deepened their markets, but there is large variability across countries. Domestic credit as a percentage of GDP appears to be well above the world average in Malaysia and Thailand, and to some extent Viet Nam, but is still under-developed in Cambodia, Indonesia and the Philippines (Figure 1.18). This diversity can also be observed in stock markets, with Thailand and Malaysia presenting the most developed markets in the region. By contrast, Myanmar has no stock exchanges, and exchanges in Lao PDR and Cambodia were created only very recently, in 2010.

Some segments of the non-bank financial markets are insufficiently developed. Equity markets have grown since the Asian financial crisis, but secondary markets are still not very liquid. Weak corporate governance is reported to have hampered such developments (OECD, 2013c). Bond market capitalisation has increased only slowly and remains well below OECD levels. Progress has been uneven with some growth in observed in Malaysia, Thailand, Viet Nam and China since 2000, while the market has shrunk in Indonesia. Corporate bond markets appear to be particularly shallow, making private sector financing highly dependent on bank financing.

Figure 1.18. **The financial sector and stock markets can be deepened further**
2012 or latest available year



Note: Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies. “Stocks traded” refers to the total value of shares traded during the period. ASEAN-6 and ASEAN-9 are the arithmetic averages of the countries appearing on the left side of the respective figures.

Source: Authors’ calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed June 2014.

Alternative financing to serve the needs of young or small firms has developed, but remains marginal. The venture-capital industry is still underdeveloped or non-existent in most ASEAN economies. One reason may be the shallowness of stock markets and the small number of initial public offerings, which provide an exit opportunity for venture capitalists. In recent years, micro-finance initiatives have gained prominence in ASEAN economies, but many of the providers are informal. ASEAN governments have sought to better regulate micro-finance but progress so far has been slow.

For the Southeast Asian countries with the least developed financial markets, like Cambodia, Laos PDR, Myanmar and Viet Nam, official development assistance can be an important source of investment capital (OECD, 2011a). However, there is also the need to build the necessary capacity and monitoring system to ensure the effective use of funds. International experience indicates that development co-operation host countries use external funds more effectively when they do not come from fragmented sources and are instead channelled into the national budgetary process. This builds the capacity of countries to pursue their own development plans (OECD/UNDP, 2014; OECD, 2014a).

1.5. A set of green growth indicators can help formulate policies and track progress

Shifting to a green growth model needs to be accompanied by a highly reliable set of measurement tools. These are necessary to evaluate policies, track progress and raise the profile of green growth among the public and policy makers. This project has developed a set of green growth indicators to be used by Southeast Asian countries in line with the OECD’s green growth measurement framework (see OECD, 2014b).¹²

The indicators have been selected following five guiding principles:

- provide balanced coverage of the two dimensions of green growth – “green” and “growth” – and of their main elements, with particular attention given to indicators capturing the interface between the two
- reflect key issues of common relevance to green growth in Southeast Asian countries
- are easy to communicate
- are measurable and comparable across countries
- align with the OECD measurement framework for green growth.

The indicators were derived from existing OECD databases, the Food and Agriculture Organization (FAO), the World Bank’s World Development Indicators and other sources.

The proposed indicators in Table 1.6 are a starting point and the list is neither exhaustive nor final. It represents a first selection made on the basis of the existing work and experience of the OECD and other international organisations. Gaps exist, both in terms of data availability and quality, as well as at the conceptual level. It should also be stressed that data for all indicators proposed are national averages, which often encompass wide variations within the country. Another caveat in selecting green growth indicators is that, as in most other domains of measurement, indicators are often proxies and context-specific and need to be read in conjunction with other indicators on the list. The list of the proposed indicators will be further developed as new data become available and existing concepts evolve. The indicators are divided into five parts:

1. *The socio-economic context and characteristics of growth:* These indicators offer background information to help track the interaction between green growth policies, on the one hand, and economic growth, poverty reduction, social equity and inclusion, on the other.
2. *Environmental trends and resource productivity:* These capture the efficient use of natural capital and aspects of production, including: 1) carbon and energy productivity indicators to reflect interactions with the climate system and the global carbon cycle; 2) resource productivity, which reflects the environmental and economic efficiency of natural resources and materials use.
3. *The natural asset base:* These capture the need to maintain the natural asset base; declining natural resources can adversely affect economic growth and social welfare. Natural resource stocks are part of the natural capital and they provide raw materials, energy carriers, water, air, land and soil, and support the provision of environmental and social services that are necessary to develop man-made, human and social capital.
4. *The environmental quality of life:* These capture how environmental conditions and amenities interact with people’s lives, with specific reference to population access to environmental services such as clean water and sanitation.
5. *Economic opportunities and policy responses:* These help discern the effectiveness of policy in delivering green growth. For Southeast Asia countries, particular emphasis is placed on official development assistance (ODA) targeting local and global environmental objectives (biodiversity, climate change, desertification and the local environment; see Box 1.2). ODA must be used to promote the economic development and welfare of developing countries and must be concessional in

Table 1.6. A set of green growth indicators for Southeast Asian countries

Main area	Indicators
The socio-economic context and characteristics of growth	Real GDP, Index 1990=100 Gross national income Inflation Poverty rate, % Life expectancy
The environmental and resource productivity	CO₂ productivity <ul style="list-style-type: none"> • Production-based CO₂ emissions, index 1990=100 • Production-based CO₂ productivity, USD per kg of CO₂ • Production-based CO₂ intensity, tonnes <i>per capita</i> • Demand-based CO₂ productivity, real net national income per unit of CO₂ Energy productivity <ul style="list-style-type: none"> • Energy productivity (GDP per unit TPES), USD per ktOE (kilotonnes of oil equivalent) • Energy intensity, toe <i>per capita</i> • Renewable energy supply, % TPES • Renewable electricity, % total electricity generation Material productivity <ul style="list-style-type: none"> • Non-energy domestic material consumption – DMC, 1990=100 • Non-energy material productivity, USD per kg
The natural asset base	Freshwater resources <ul style="list-style-type: none"> • Available freshwater resources, thousand m³ <i>per capita</i> • Renewable freshwater, thousand m³ <i>per capita</i> • Total freshwater abstraction, thousand m³ <i>per capita</i> • Water stress, total freshwater abstraction % total available resources • Water stress, abstraction % total internal resources Forest resources and land use changes <ul style="list-style-type: none"> • Arable and cropland, % total land area • Pasture, % total land area • Forest, % total land area • Other land, % total land area Wildlife resources <ul style="list-style-type: none"> • % Threatened species – Mammals • % Threatened species – Birds • % Threatened species – Vascular plants
The environmental dimension of quality of life	Environmentally induced health problems and related costs (e.g. years of healthy life lost from degraded environmental conditions) <ul style="list-style-type: none"> • Population exposure to air pollution • Population exposure to air pollution Access to sewage treatment and drinking water <ul style="list-style-type: none"> • Population connected to sewage treatment • Population with sustainable access to safe drinking water
Economic opportunities and policy response	Official development assistance (ODA) <ul style="list-style-type: none"> • ODA – Biodiversity, % total ODA • ODA – Climate change adaptation, % Total ODA • ODA – Desertification, % total ODA • ODA – Environment sector, % total ODA • ODA – Renewable energy, % total ODA • ODA – Water supply and sanitation, % Total ODA • ODA – Total, % GNI

Note: GDP: gross domestic product; GNI: gross national income; ODA: official development assistance; TPES: total primary energy supply; USD: United States Dollar

Source: OECD (2014), *Green Growth Indicators 2014*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264202030-en>.

character (OECD, 2008). Data constraints have not permitted the construction of indicators on important policy aspects such as spending on environmental related research and development, patents and environmentally related taxes.

A number of countries have already started using these green growth indicators to understand their green growth trajectories and develop their own indicators tailored to their national circumstances (Box 1.5).

Other international bodies have also started working on green growth. For example, the United Nations Environment Program (UNEP) has published a framework document “*Measuring Progress towards an Inclusive Green Economy*” (UNEP, 2012) and is preparing a manual on using indicators to develop green economy policies. The World Bank is also operating a Wealth Accounting and Valuation of Ecosystem Services (WAVES) Global Partnership (OECD, 2014b; WAVES, 2014; see Chapter 3).

International co-operation is paramount to achieve synergies and advance knowledge on the measurement of green growth. The OECD is working with the Global Green Growth Institute, UNEP and the World Bank within the framework of the Green Growth Knowledge Platform (GGKP). GGKP is a network of international organisations and experts offering practitioners and policy makers the policy guidance, good practices, tools, and data necessary to support the transition to a green economy. One outcome of this co-operation has been the preparation of a report – *Moving Towards a Common Approach on Green Growth Indicators* – which builds on the OECD green growth measurement framework.

Box 1.5. National experiences with green growth indicators

A number of countries are already using the OECD framework to gauge the state of their economy in terms of green growth and have developed indicators to better reflect their national circumstances. Among these are OECD countries, as well as countries in Latin America and the Caribbean; in Eastern Europe, Caucasus and Central Asia; and in East Asia.

For instance, based on the OECD framework, the **Netherlands** published a first set of 20 green growth indicators in 2011 that were defined by an inter-ministerial working group under the direction of the Ministry of Infrastructure and Environment; the **Czech Republic** has developed a set of 27 green growth indicators, with the work being conducted by the Czech Statistical Office in co-operation with the Charles University Environment Centre; **Korea** used the OECD framework to build 30 green growth indicators as part of its five-year plan for green growth adopted in 2009 with the aim of assessing progresses towards green growth and monitoring the implementation of the five-year plan (the work is carried out by Statistics Korea in co-operation with the Seoul National University and the Presidential Committee on Green growth); **Denmark** has developed indicators on economic opportunities and policy responses in the field of climate change and energy efficiency with special attention given to green production and to the environmental goods and services sector (the results are published jointly by the Danish Energy Agency of the Ministry of Climate, Energy and Building, the Danish Business Authority of the Ministry of Business and Growth and the Danish Environmental Protection Agency of the Ministry of the Environment); in **Germany** the statistical office has developed 27 indicators, building on the German experience with sustainable development indicators and with environmental accounting; the **Slovak Republic** and **Slovenia** have also started work to develop a national set of green growth indicators.

Box 1.5. National experiences with green growth indicators *(continued)*

In **Chile**, the Ministry of Finance and the Ministry of the Environment developed a Green Growth Strategy to promote economic growth while protecting the environment, creating jobs, and encouraging social equity. The strategy involves monitoring and measurement through green growth indicators building on the OECD framework, supplemented with behavioural and wellbeing indicators. **Mexico** is applying the OECD Green Growth indicators, building on experience with environmental accounting. Additional country specific indicators relate to: the productivity of wastewater treatment services, subsidies to electric power services, and companies with green certifications. The work is led by the National Statistical and Geographical Institute (INEGI).

In Latin America and the Caribbean, **Colombia, Costa Rica, Ecuador, Guatemala, Paraguay and Peru**, in co-operation with the United Nations Industrial Development Organization (UNIDO) the OECD, the Latin American Development Bank (CAF), the Latin American and Caribbean Economic System (SELA) and UNEP, have started work to establish a framework to monitor green growth in the LAC region based on the OECD Green Growth measurement framework and drawing upon UNEP work on environmental indicators in Latin America. A considerable wealth of information has thus been compiled, and is already being disseminated and published. Particular attention is given to the living standards of people and opportunities from green growth. Examples of additional country specific indicators include: malnutrition, acute respiratory infections and reforestation.

In **Eastern Europe, Caucasus and Central Asia**, a pilot application of the OECD green growth indicators is underway in **Kyrgyzstan**. The work is carried out under the EAP Task Force, a body for which the OECD serves as secretariat and which supports the implementation of green growth policies in this region. The aim is to contribute to the establishment of a Shared Environmental Information System in the pan-European region, focusing on the long-term prospects for a commercially viable exploitation of natural assets. **Kazakhstan**, which has large oil reserves, is interested in applying the OECD framework to support its move towards cleaner energy sources for power generation.

Source: OECD (2014).

1.6. Conclusion: Economic growth does not have to mean environmental degradation

To achieve long-term economic growth and well-being, ASEAN countries need to decouple economic growth from natural capital depletion and environmental degradation. Although these countries have experienced strong macroeconomic performance in recent years, fast natural capital depletion and environmental degradation, if continued unabated, will put at risk the gains in well-being the region has so far achieved, and will eventually slow down economic growth.

The right framework conditions may ease the transition onto a green growth path. These will help release a country's economic potential while at the same time protecting the environment and ensuring a sustainable management of natural resources. Such enabling conditions include:

- A stable and transparent institutional framework that will boost economic growth while at the same time facilitating the design and the implementation of green growth strategies. Some Southeast Asian countries have already established institutions for the design and management of green growth strategies; these should

be further strengthened and used more widely across the region (discussed further in Chapter 2).

- Tax systems that ensure the price of goods and services reflect their social and environmental value; across Southeast Asia tax systems could be improved by means of environmental tax reforms. Such reforms would shift taxation away from labour, income and capital and onto pollution and resource use so as to align the prices of goods and services with their actual social and ecological value. By making the tax system less distortive, environmental tax reforms can also promote economic growth, thus helping Southeast Asian countries escape the middle-income trap. Viet Nam has made a good first attempt at these reforms, which should be pursued further and extended across the region.
- Competition policies and laws will have to be introduced in the ASEAN countries where they are still lacking. Regional collaboration will be paramount to promote an effective competition framework underpinning the ASEAN Economic Community, which is scheduled to be established in 2015. Competitive pressures are a key factor in boosting the low innovation rates in the region and, if accompanied by the right policies and incentives, will foster green innovations and the deployment of green technologies.
- Improving the education system, especially in the region's least developed countries, can help create the skills required for a green growth model. Reducing informality and ensuring a flexible formal labour market will help shift workers to the greener sectors and firms.
- Deepening financial markets backed by well-designed financial regulations can provide important sources of finance for green investment in addition to official development assistance.

The region's move towards a green growth development model will also need to be accompanied by a monitoring system that tracks economic, social and environmental indicators. This will enable each country to track progress towards green growth in conjunction with the achievement of other important national priorities, such as poverty reduction. The data set of green growth indicators for Southeast Asian countries developed for this project – described above – is a first step in this direction. While these indicators will need to be refined and revised according to country needs, they are key for the development of any green growth strategy and for raising the profile of green growth among policy makers and the public at large.

Notes

1. Around 26% of ASEAN's total trade takes place among member countries. The group's trade with China has grown significantly (from less than 4% in 2000 to more than 10% in 2011). Over the same period, the share of ASEAN trade with industrialised economies declined from 54% to 36%.
2. Basel III (or the Third Basel Accord), established in December 2010 and revised in June 2011, provides global regulatory standards on bank capital adequacy and liquidity. It was endorsed by the G20 Leaders at their November 2010 Seoul summit (BIS, 2011).

3. Fertiliser consumption per hectare of arable land is high also in Singapore. However, Singapore has very limited farm land (about 7 km²) so total fertiliser use is low and as a result Singapore's water pollutant concentrations are low, according to national sources.
4. Data and projections for urban waste production need to be interpreted with caution. In many Southeast Asian countries, especially the poorest ones, a large share of waste disposal is informal and unregulated and therefore there are no reliable data.
5. In Singapore, domestic waste generation has remained at less than 0.9 kg per person a day for the last five years.
6. This aspect is especially important in less developed economies; the absence of social safety nets means the poor face greater risks than the better off and have little or no means to deal with them. This makes them risk adverse and thus hampers economic growth.
7. The dataset is available online at <http://cpi.transparency.org/cpi2013/>.
8. For example, climate change finance is poised to rise noticeably over the next decade as developed countries increase resources to meet their pledges under the UN Framework Convention on Climate Change (UNFCCC). USD 30 billion was pledged in fast start financing from 2009 to 2012. This will need to increase to meet the target of USD 100 billion annually by 2020, and will come from both public and private sources (OECD, 2014a).
9. Earmarking can make the budget more rigid, and create obstacles for the re-evaluation and modification of taxes and spending programmes. Also, in the context of environmental taxation, earmarking might violate the polluter pays principle, thus reducing the effectiveness of environmental taxes and (OECD, 2006).
10. Indonesia's present VAT excludes mining and drilling activities, along with most of the financial, transport, and hotel and restaurant sectors.
11. Bidding systems which are conducted on a day-ahead basis effectively exclude wind power, for instance.
12. The OECD launched the first set of green growth indicators in *Towards Green Growth: Monitoring Progress* (OECD, 2011b). It is now working with member countries and other international organisations to review these indicators and develop the statistical basis for environmental accounts in accordance with the System of Environmental-Economic Accounting (SEEA) (OECD, 2014b).

Annex 1.A1

Domestic material consumption in Southeast Asia

Domestic material consumption (DMC) refers to all materials used for intermediate and final consumption in a country before being released to the environment as waste. DMC indicates the domestic waste potential. Data on DMC have been computed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the United Nations Environment Programme (UNEP) for the period 1970 to 2008. These data summarise the effects of domestic extraction and physical net trade. Data are presented in tonnes and measure materials that enter the economic process.

Figure 1.A1.1. Domestic material consumption in Southeast Asia

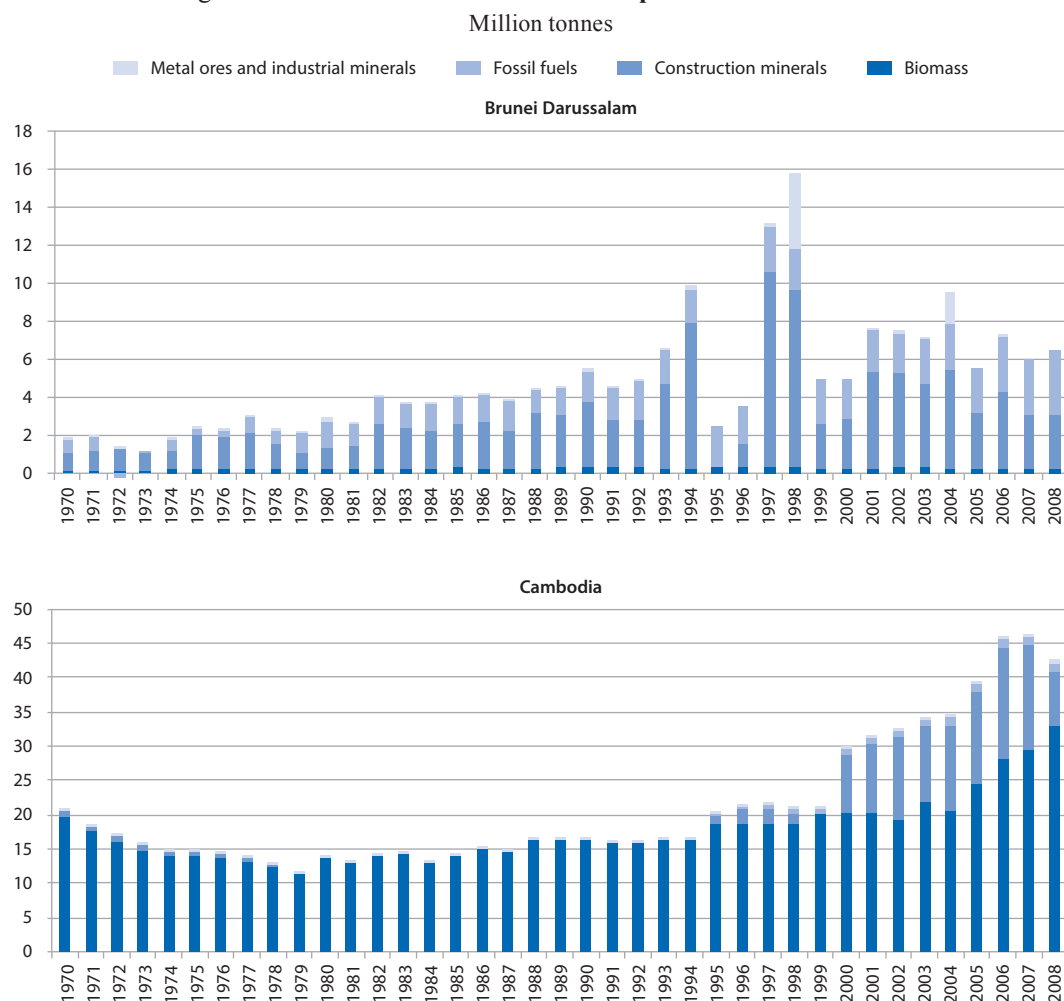


Figure 1.A1.1. Domestic material consumption in Southeast Asia (continued)

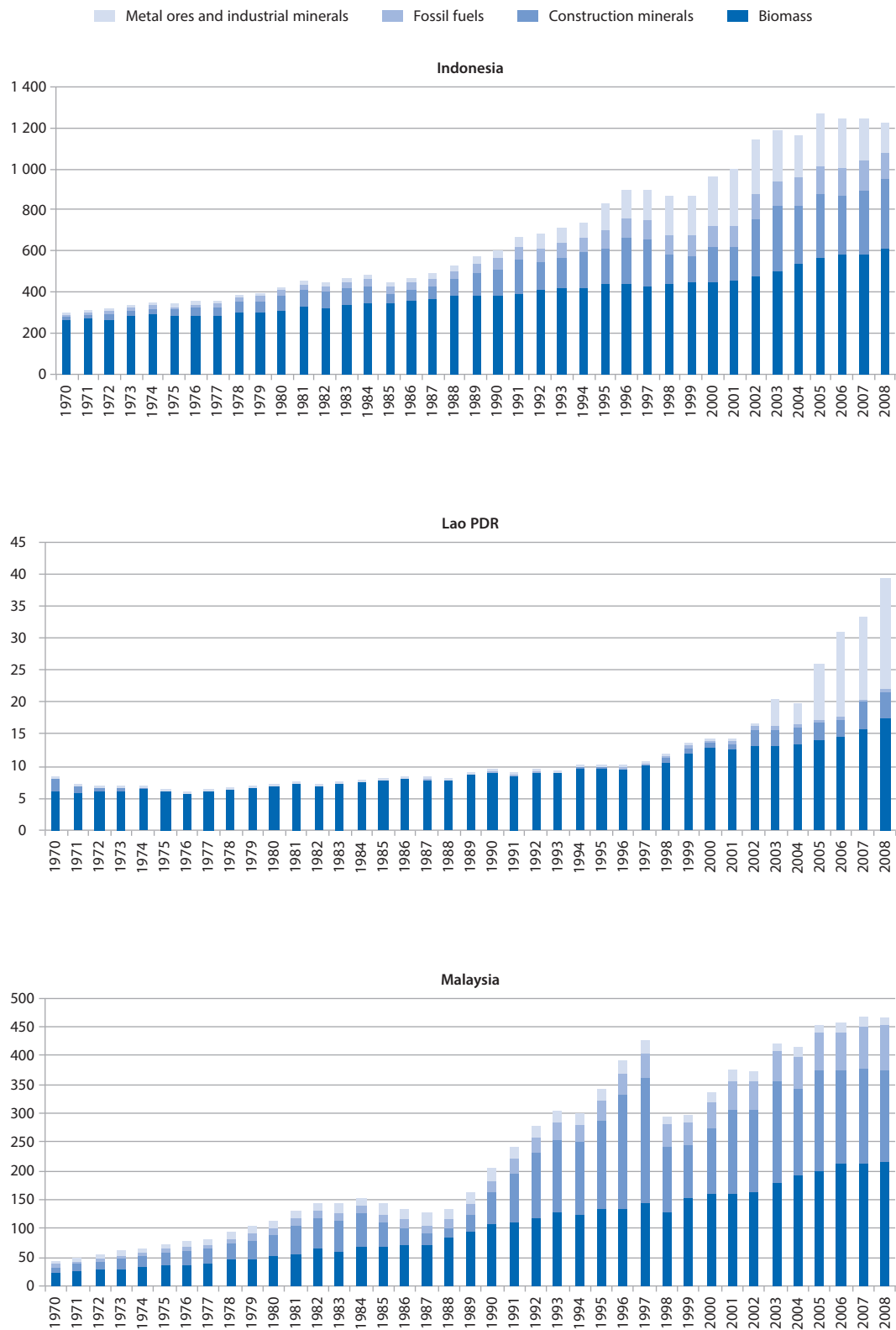


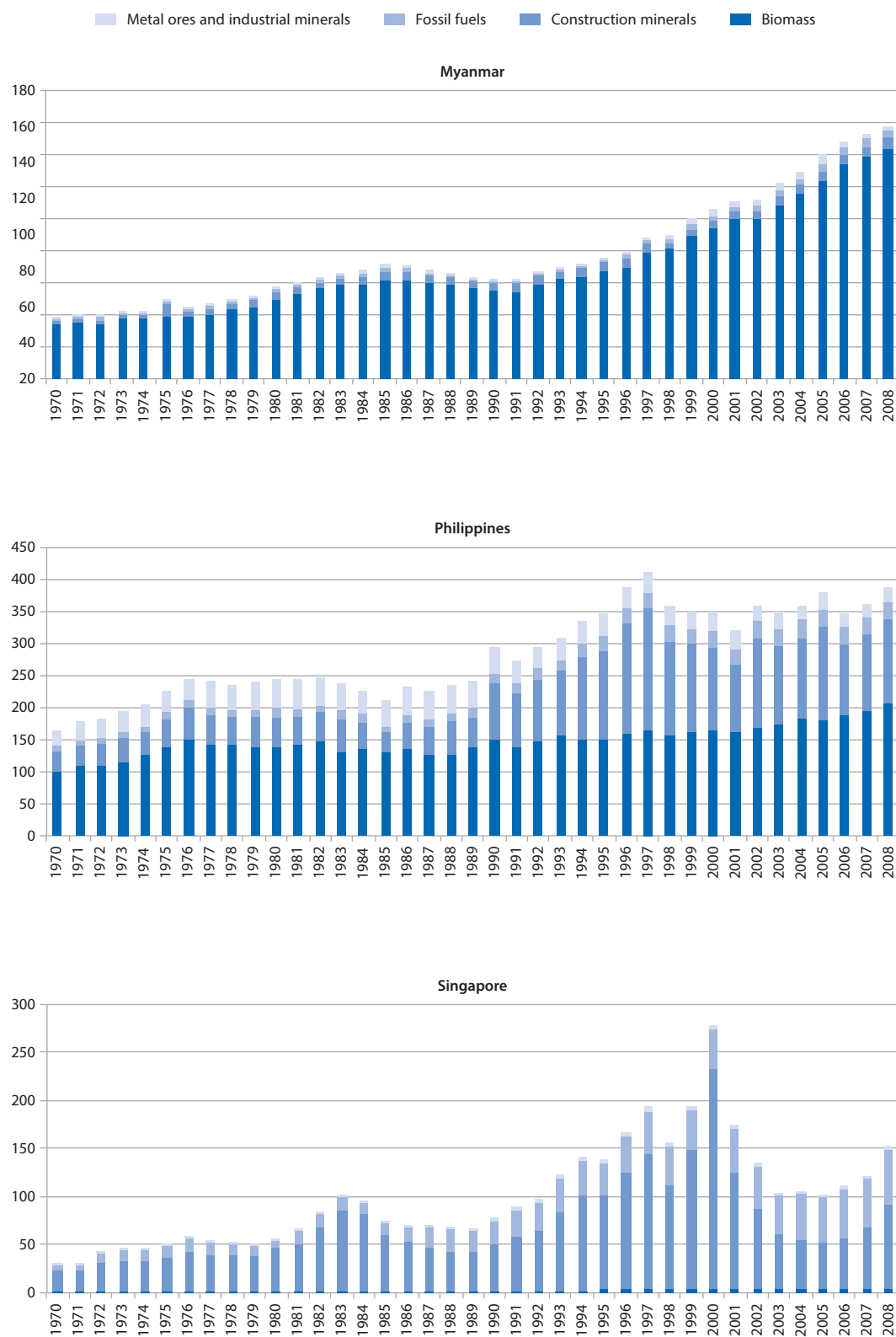
Figure 1.A1.1. **Domestic material consumption in Southeast Asia** (*continued*)

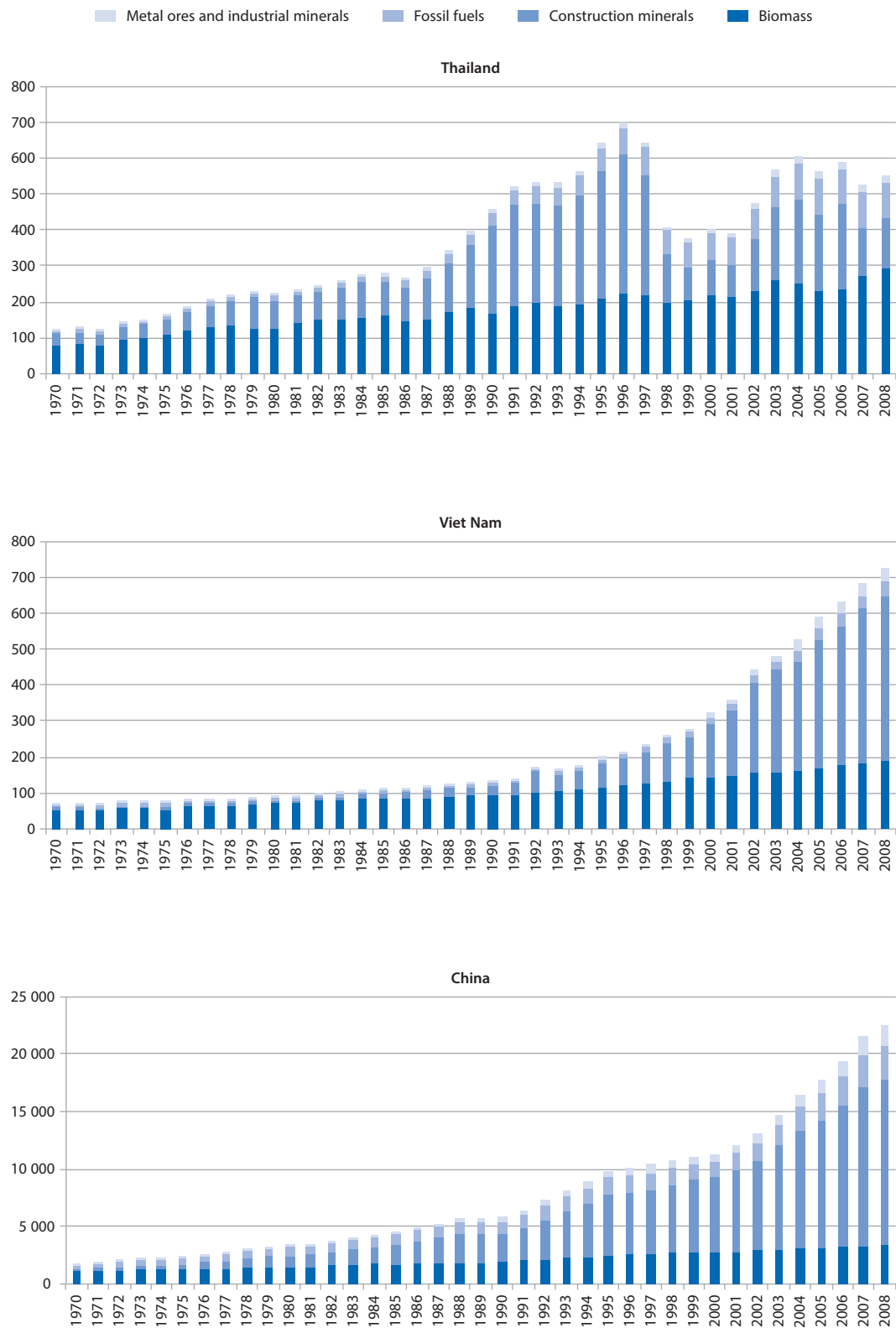
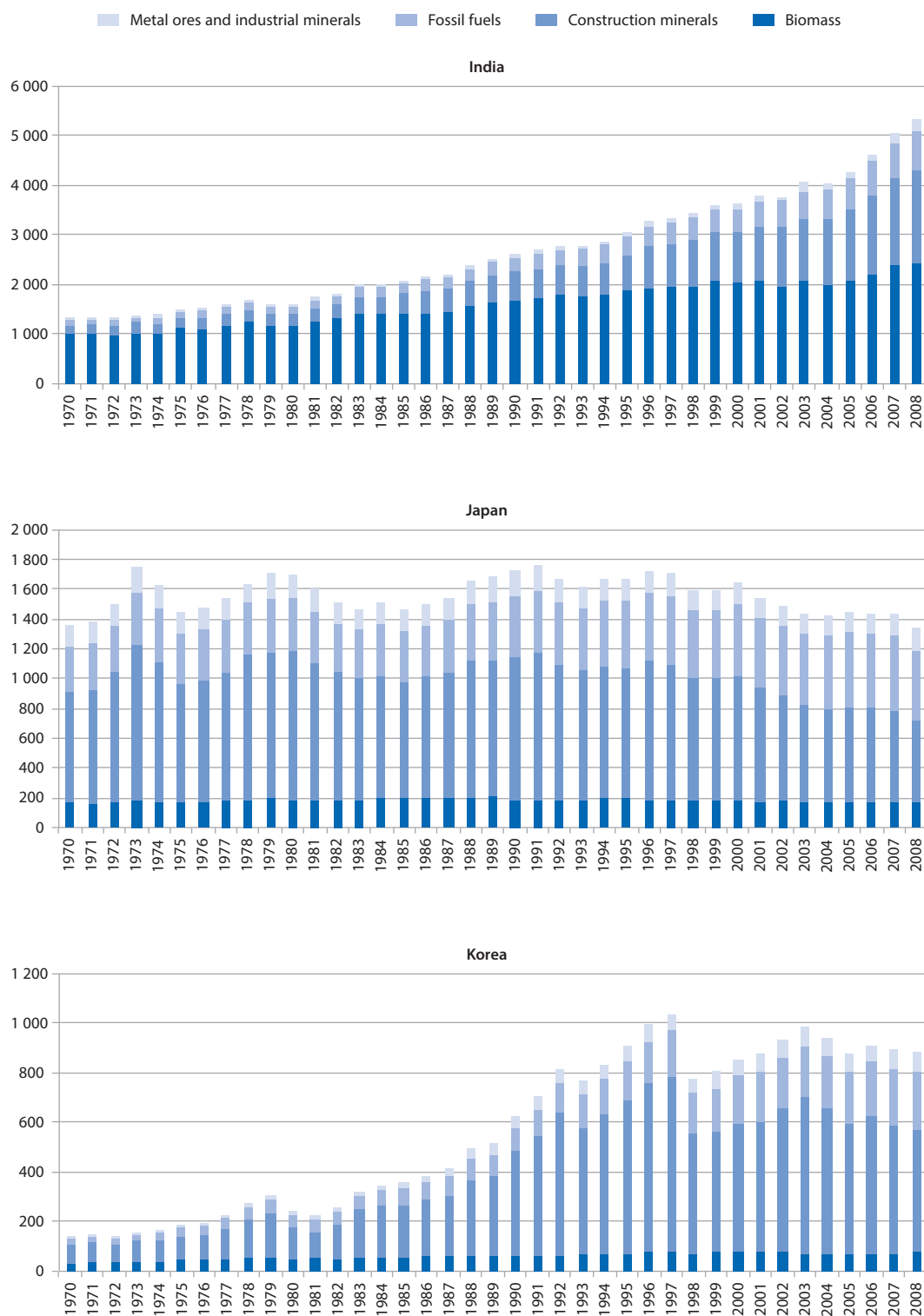

Figure 1.A1.1. **Domestic material consumption in Southeast Asia** (*continued*)

Figure 1.A1.1. **Domestic material consumption in Southeast Asia** (*continued*)StatLink  <http://dx.doi.org/10.1787/888933167850>

Source: Authors' calculations based on CSIRO and UNEP Asia-Pacific Material Flows database, www.cse.csiro.au/forms/form-mf-start.aspx, accessed August 2014.

Bibliography

- Acemoglu, D. et al. (2012), “The environment and directed technical change”, *American Economic Review*, 102(1), 131-166.
- ADB (2012), *Key Indicators for Asia and the Pacific 2012*, Asian Development Bank, Manila.
- ADB (2011), *Towards a Sustainable Municipal Organic Waste Management in South Asia*, Asian Development Bank, Manila.
- ADB (2013), *ASEAN 3030: Towards a Borderless Economic Community*, Asian Development Bank Institute, Tokyo.
- ASEAN (2009), *Fourth ASEAN State of the Environment Report 2009*, ASEAN Secretariat, Jakarta.
- Beaton, C. and L. Lontoh (2010), “Lessons learned from Indonesia’s attempts to reform fossil-fuel subsidies”, *Trade, Investment and Climate Change Series October 2010*, The International Institute for Sustainable Development, Winnipeg, available at www.iisd.org/gsi/sites/default/files/lessons_indonesia_fossil_fuel_reform.pdf.
- BIS (2011), *Basel III: A global regulatory framework for more resilient banks and banking systems*, BIS Website, Bank for International Settlements, Basel, Switzerland, available at www.bis.org/publ/bcbs189_dec2010.htm, accessed 18 September 2014.
- Bridel, A. and L. Lontoh (2014), “Lessons learned: Malaysia’s 2013 fuel subsidy reform”, *Research Report March 2014*, The International Institute for Sustainable Development, Winnipeg, available at www.iisd.org/gsi/sites/default/files/ffs_malaysia_lessonslearned.pdf.
- Buchner, B., J. Brown and J. Corfee-Morlot (2011), “Monitoring and tracking long-term finance to support climate action”, *OECD/IEA Climate Change Expert Group Papers*, No. 2011/03, OECD Publishing, <http://dx.doi.org/10.1787/5k44zcqbbj42-en>.
- Chhabra, A., K.R. Manjunath, and S. Panigrahy (2010), “Non-point source pollution in Indian agriculture: estimation of nitrogen losses from rice crop using remote sensing and GIS”, *International Journal of Applied Earth Observation and Geoinformation*, Vol. 12(3), 190–200.
- Corcoran, E. et al. (eds) (2010), *Sick Water? The central role of waste-water management in sustainable development. A Rapid Response Assessment*, United Nations Environment Programme, UN-HABITAT, GRID, Arendal.
- Dellink, R. et al. (2014), “Consequences of climate change damages for economic growth: a dynamic quantitative assessment”, *OECD Economics Department Working Papers*, No. 1135, OECD, Paris.
- Durand-Lasserve, O. et al. (forthcoming), “Distributional impacts of energy subsidy reform in Indonesia”, *OECD Environment Working Papers*, OECD, Paris.
- Ekins, P. and S. Speck (2010), “Competitiveness and environmental tax reform”, *Briefing Paper Seven*, Green Fiscal Commission, London.
- Ekins, P. and S. Speck (2011), *Environmental Tax Reform (ETR): A policy for green growth*, Oxford University Press, Oxford.

- Evans, A.E.V. et al. (2012), “Water quality: assessment of the current situation in Asia”, *International Journal of Water Resources Development*, Vol. 28(2), 195-216.
- Gertler, P. et al. (2013), “Labour market returns to early childhood stimulation: a 20-year follow up to an experimental intervention in Jamaica”, *World Bank Policy Research Working Paper Series* no. 6529, The World Bank Group, Washington, DC.
- Hanushek, E.A. and L. Wössmann (2010), “Education and economic growth”, *International Encyclopedia of Education*, Vol. 2, 245-252.
- Holzmann, R. (2001), “Risk and vulnerability: the forward looking role of social protection in a globalizing world”, *Social Protection Discussion Papers* No 23161, The World Bank, Washington, DC.
- IEA (2013a), *Southeast Asia Energy Outlook*, OECD/International Energy Agency, Paris.
- IEA (2013b), *CO₂ Emissions from Fuel Combustion Statistics 2013*, International Energy Agency, Paris, www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion-highlights-2013-.html.
- IEA (2013c), *World Energy Outlook*, OECD/International Energy Agency, Paris.
- IEA (2012), *Technology Roadmap: High-Efficiency, Low-Emissions Coal-Fired Power Generation*, OECD/International Energy Agency, Paris.
- IMF (2011), “Revenue mobilization in developing countries”, *IMF Policy Paper*, International Monetary Fund, Washington, DC, www.imf.org/external/np/pp/eng/2011/030811.pdf.
- Jaeger, C.C. et al. (2011), *A New Growth Path for Europe. Generating Prosperity and Jobs in the Low-Carbon Economy*, synthesis report for the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Potsdam, Germany, www.pik-potsdam.de/members/cjaeger/a_new_growth_path_for_europe_synthesis_report.pdf.
- Jankowska, A., A.J. Nagengast and J.R. Perea (2012), “The middle-income trap: comparing Asian and Latin American experiences”, *OECD Development Centre Policy Insights* no. 96, OECD, Paris, available at www.oecd.org/dev/50305488.pdf.
- Lee, C. and Y. Fukunaga (2013), “ASEAN regional cooperation on competition policy”, *ERIA Discussion Paper Series* No. 2013-033, Economic Research Institute for ASEAN and East Asia, Jakarta.
- Levine, R. (2004), “Finance and growth: theory and evidence”, *NBER Working Paper* No. 10766, National Bureau of Economic Research, Cambridge, MA.
- Martinez-Fernandez, C. and K. Choi (2012), “Skills development pathways in Asia”, *OECD Local Economic and Employment Development (LEED) Working Papers*, No. 2012/12, OECD Publishing, <http://dx.doi.org/10.1787/5k94hdlll7vk-en>.
- Mourougane, A. (2010), “Phasing out energy subsidies in Indonesia”, *OECD Economics Department Working Papers*, No. 808, OECD, Paris.
- Neumayer, E. (2013), *Weak versus Strong Sustainability: Exploring the limits of two opposing paradigms*, Edward Elgar Publishing, Cheltenham.
- Nicoletti, G. and S. Scarpetta (2003), “Regulation, productivity and growth: OECD evidence”, *OECD Economics Department Working Paper* No. 347, OECD, Paris.

- Nuntapotidech, A. (2012), “Asia regional dialogue on green economy approaches: Thailand case”, presentation at the *Asia Regional Dialogue on Inclusive Green Economy Approaches*, Bangkok, 27-28 September.
- OECD (2014a), *Development Co-operation Report 2014: Mobilising resources for sustainable development*, OECD Publishing, <http://dx.doi.org/10.1787/dcr-2014-en>.
- OECD (2014b), *Green Growth Indicators 2014*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264202030-en>.
- OECD (2013a), *Putting Green Growth at the Heart of Development*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264181144-en>.
- OECD (2013b), “Development Assistance Committee List of Official Development Assistance Recipients”, updated 1 January 2013, OECD, Paris, available at www.oecd.org/dac/stats/daclist.
- OECD (2013c), *Southeast Asian Economic Outlook 2013: With Perspectives on China and India*, OECD Publishing, <http://dx.doi.org/10.1787/saeo-2013-en>.
- OECD (2013d), *Outlook on Aid: Survey on donors’ forward spending plans 2013-2016*, OECD, Paris, available at www.oecd.org/dac/aid-architecture/OECD%20Outlook%20on%20Aid%202013.pdf.
- OECD (2013e), *Innovation in Southeast Asia*, OECD Publishing, <http://dx.doi.org/10.1787/9789264128712-en>.
- OECD (2013f), *Multi-dimensional Review of Myanmar, Volume 1. Initial Assessment*, OECD Development Pathways, OECD Publishing, <http://dx.doi.org/10.1787/9789264202085-en>.
- OECD (2012a), *Environmental Outlook to 2050: The consequences of inaction*, OECD Publishing, <http://dx.doi.org/10.1787/9789264122246-en>.
- OECD (2012b), *Southeast Asian Economic Outlook 2011/12*, OECD Publishing, <http://dx.doi.org/10.1787/9789264166882-en>.
- OECD (2012c), *Green Growth and Developing Countries: A summary for policy makers*, OECD, Paris, www.oecd.org/dac/50526354.pdf.
- OECD (2012d), “The jobs potential of a shift towards a low-carbon economy”, *OECD Green Growth Papers*, No. 2012/01, OECD Publishing, <http://dx.doi.org/10.1787/5k9h3630320v-en>.
- OECD (2011a), OECD (2011), *Towards Green Growth*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264111318-en>.
- OECD (2011b), *Towards Green Growth: Monitoring progress, OECD indicators*, OECD, Paris, www.oecd.org/greengrowth/48224574.pdf.
- OECD (2008), *Natural Resources and Pro-Poor Growth: The economics and politics*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264111318-en>.
- OECD (2006), *The Political Economy of Environmentally Related Taxes*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264025530-en>.
- OECD (2005), *Environmental Fiscal Reform for Poverty Reduction*, DAC Guidelines and Reference Series, OECD Publishing, <http://dx.doi.org/10.1787/9789264008700-en>.

- OECD/Cedefop (2014), *Greener Skills and Jobs*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264208704-en>.
- OECD/UNDP (2014), *Making Development Co-operation More Effective: 2014 Progress Report*, OECD Publishing, <http://dx.doi.org/10.1787/9789264209305-en>.
- Park, S.-J., M. Yamazaki and S. Takeda (2012), “Environmental tax reform for low carbon green growth: major findings and policy implications from a multi-regional economic simulation analysis”, *Presentation at the East Asia Low Carbon Green Growth Roadmap Forum*, 25-26 April 2012, Seoul, Republic of Korea.
- Schwela, D. et al. (2012), *Urban Air Pollution in Asian Cities: Status, challenges and management*, Taylor and Francis, Stockholm.
- Sheng Y. (2012), “The challenges of promoting productive, inclusive and sustainable urbanization”, in Sheng, Y. and M. Thuzar (eds.), *Urbanization in Southeast Asia Issues and Impact*, Institute of Southeast Asian Studies, Singapore.
- Shimada T. and T. Yang (2010), “Challenges and development in financial systems of Southeast Asian economies”, *OECD Journal: Financial Market Trends*, Vol. 2010, Issue 2.
- Sigham, G. and S. Hariharan (2012), *Competition Laws in ASEAN: A South-East Asian perspective*, Rodyk Strategic Advice, *Competition Law Alert*, available at www.rodyk.com/usermedia/documents/Rodyk_ReportDec-Competition%20Law%20Alert.pdf.
- UN Women Watch (2009), *Women, Gender Equality and Climate Change*, available at www.un.org/womenwatch/feature/climate_change/downloads/Women_and_Climate_Change_Factsheet.pdf.
- UNEP (2013), *Sustainable Public Procurement: A Global Review*, United Nations Environment Programme, Nairobi.
- UNEP (2012), *Measuring Progress towards an Inclusive Green Economy*, United Nations Environment Programme, Nairobi.
- UNESCAP (2012), *Low Carbon Green Growth Roadmap for Asia and the Pacific: Turning resource constraints and the climate crisis into economic growth and opportunities*, The Economic and Social Commission for Asia and the Pacific, Bangkok.
- UNESCAP-ADB-UNEP (2012), *Green Growth, Resource and Resilience*, The Economic and Social Commission for Asia and the Pacific and Asian Development Bank, Bangkok.
- WAVES (2014), *WAVES Annual Report 2014*, Wealth Accounting and Valuations of Ecosystem Services, available at www.wavespartnership.org/sites/waves/files/documents/WAVES_2014AR_REV_low-FINAL.pdf.
- World Bank (2011), “The World Bank Supports Thailand’s Post-Floods Recovery Effort”, World Bank News website 13 December 2011, available at www.worldbank.org/en/news/feature/2011/12/13/world-bank-supports-thailands-post-floods-recovery-effort, accessed 1 October 2014.
- Zhang, Y.S., and H. Shi (2011), “How carbon emission mitigation promotes economic development—a theoretical framework”, unpublished manuscript, available at www.gci.org.uk/Documents/How%20carbon%20emmission%20mitigation%20promotes%20economic%20development-2011-04-clean.pdf.
- Zhang, Y., and H.L. Shi (2014), “From burden-sharing to opportunity-sharing: unlocking the climate negotiations”, *Climate Policy*, Vol. 14(1), 63-81.

Chapter 2

Mainstreaming green growth into national development planning

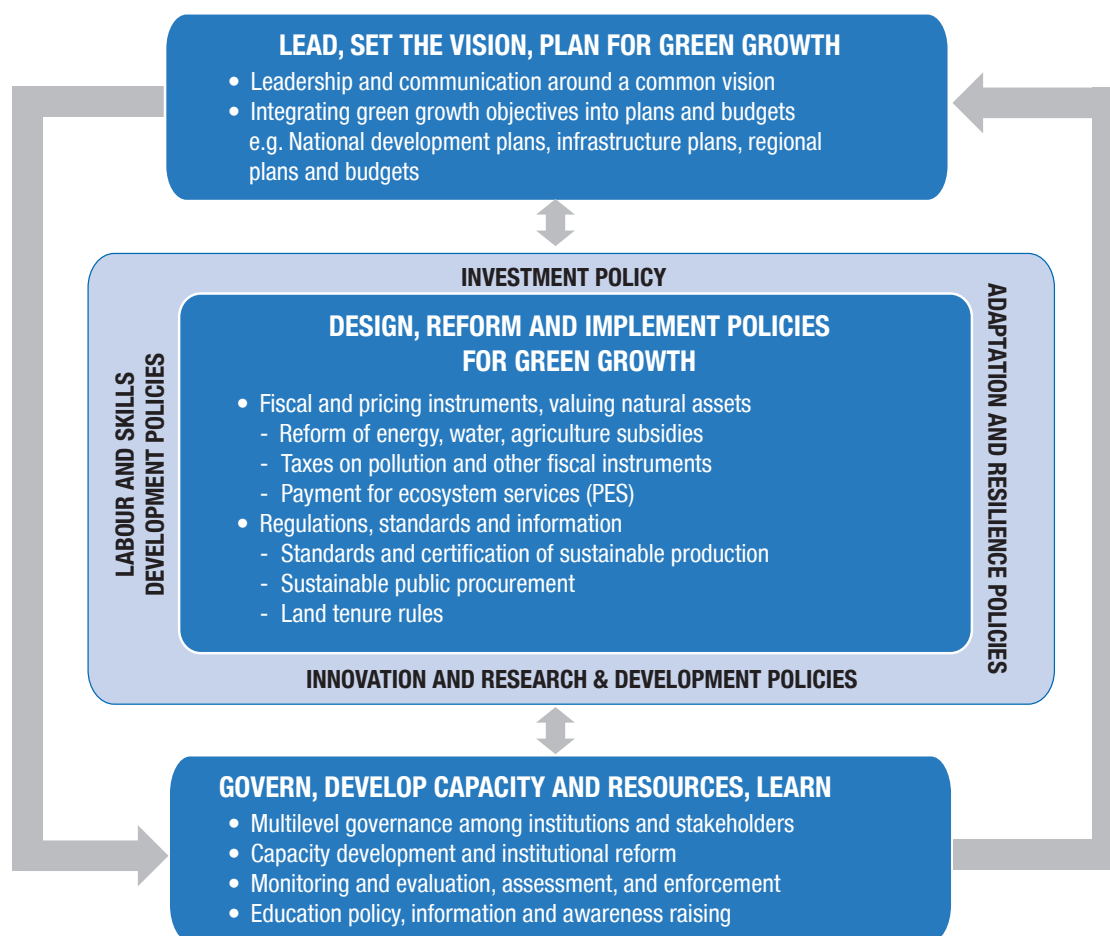
Countries' efforts to pursue green growth are most effective when guided by a national strategy, ideally designed through stakeholder engagement and championed by top national officials. But to enhance effectiveness and promote coherent policies, green growth objectives should also be integrated into existing national development plans and budgets. This chapter reviews the status of ASEAN countries in terms of their preparation of green growth strategies, their integration of green growth objectives into national planning, and their mechanisms for co-ordinating multiple levels and sectors of government. So far, only two countries – Cambodia and Viet Nam – have a green growth strategy in place. However, all ASEAN countries have integrated at least four green growth objectives into national development plans and improved co-ordination. Greater coherence and co-ordination are needed to build on this progress and create synergies between green growth objectives and other national priorities.

The previous chapter has made the case that pursuing green growth is an essential strategy for long-term growth and well-being in Southeast Asia. It has outlined the set of policies and indicators necessary for a green growth transition. This chapter examines the institutional mechanisms required for the efficient implementation of these policies. An important step is to develop a national strategy for pursuing green growth, which then needs to be integrated (mainstreamed) into national development plans. The chapter asks to what extent this has been done across the region. Cross-government co-ordination is also essential for achieving green growth and tackling climate change: the chapter reviews the co-ordination mechanisms existing in the ten member countries of the Association of Southeast Asian Nations (ASEAN, also referred to as Southeast Asia in this report) and makes recommendations for improving their effectiveness.

2.1. Green growth strategies should be established and integrated into national development plans

Setting a vision and planning for green growth are fundamental elements of a framework for action on green growth in developing countries (Figure 2.1). Countries' efforts to pursue green growth are most effective when guided by a national strategy,

Figure 2.1. An agenda for national action on green growth in developing countries



Source: OECD (2013a), *Putting Green Growth at the Heart of Development*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264181144-en>.

ideally designed through stakeholder engagement and championed by top national officials (OECD, 2013a). A green growth strategy can increase coherence between environmental and economic policies and communicate national policy priorities to national ministries, sub-national governments, the private sector and civil society stakeholders (OECD, 2013a).

A green growth strategy may be designed as a stand-alone document. But to enhance its effectiveness and promote coherent policies, its objectives should be integrated into existing national development plans and budgets (OECD, 2013a; OECD, 2006; European Commission, 2013; Global Climate Change Alliance, 2013). Priority documents or policies for integrating green growth objectives include multi-year national development plans; overarching national economic growth strategies or programmes; poverty reduction strategies; national budgetary policies; and sectoral, investment and spatial plans (Dalal-Clayton and Bass, 2009; OECD, 2013a).

Green growth is relevant to a large range of policy areas, including fiscal, development, technology, investment, labour, innovation, adaptation, trade and foreign policies. While it may not be possible in the short term to update policies in each of these areas to reflect green growth objectives, integrating green growth objectives into national development plans will make it easier to identify where existing policies converge with or diverge from green growth objectives, and what policy areas can be revised to avoid policy conflicts (OECD, 2013a).

Only two ASEAN countries have green growth strategies, but more have climate change plans

Countries across Southeast Asia have already established national strategies to address environmental challenges. However, only two – Cambodia and Viet Nam – focus specifically on green growth (Table 2.1, Box 2.1). Other countries have designed strategies which pursue sustainable development more broadly or which only address climate change. Yet green growth differs from sustainable development and climate change plans in important ways:

- Sustainable development is a broader concept than green growth, focusing on balancing economic, environmental and equity objectives. Green growth is a means to achieve sustainable development, as it focuses on promoting growth and development while sustaining the natural assets base that provides the resources and environmental services that are essential for long-term economic growth and human well-being (see Chapter 1); (OECD, 2013a).
- National climate change strategies are a coherent action plan to mitigate countries' contributions to climate change and/or adapt to its expected impacts. Climate change response strategies tend to cover shorter periods than green growth strategies and have a narrower focus.

Other Southeast Asian countries have adopted a more limited approach by integrating green growth considerations into other national plans, rather than preparing separate green growth strategies (Table 2.1). For instance, Malaysia created a National Green Technology Policy in 2009, but it has a narrower focus than a national strategy for green growth. Myanmar, the Philippines and Singapore (as well as Viet Nam) have created or are currently formulating sustainable development strategies.¹

Climate change strategies are more widespread in the region than national green growth strategies. Currently, eight out of ten Southeast Asian countries have formulated a national strategy on climate change. The objectives of these strategies tend to be

three-fold: 1) to mainstream climate change into national development plans; 2) to provide a framework for co-ordination for climate change actions; and 3) to outline an action plan for domestic and external financing.

Table 2.1. **National ASEAN environment strategies vary in their focus on green growth**

Countries ^a	National green growth strategy	National sustainable development strategy	National climate change strategy
Cambodia	<ul style="list-style-type: none"> The National Green Growth Roadmap (2009) 		<ul style="list-style-type: none"> Climate Change Strategic Plan (CCCSP) 2014-23
Indonesia			<ul style="list-style-type: none"> National Action Plan Addressing Climate Change (RAN MAPI) (2007) Indonesia Climate Change Sectoral Roadmap (2009) The National Action Plan for Greenhouse Gas Emissions Reduction (RAN GRK) (2011)
Lao PDR			<ul style="list-style-type: none"> Strategy on Climate Change of the Lao PDR (2010)
Malaysia	<ul style="list-style-type: none"> National Green Technology Policy (2009) 		<ul style="list-style-type: none"> National Policy on Climate Change (2009)
Myanmar		<ul style="list-style-type: none"> National Sustainable Development Strategy for Myanmar (2009) 	
Philippines		<ul style="list-style-type: none"> Philippine Agenda 21: A National Agenda for Sustainable Development for the 21st Century (1996) 	<ul style="list-style-type: none"> National Framework Strategy on Climate Change 2010-22 National Climate Change Action Plan 2011-28
Singapore ^b		<ul style="list-style-type: none"> Singapore Sustainable Development Blueprint (2009) 	<ul style="list-style-type: none"> National Climate Change Strategy (2012)
Thailand			<ul style="list-style-type: none"> National Strategy on Climate Change 2008-12 Thailand Climate Change Master Plan 2012-50; National Strategy on Climate Change 2013-17
Viet Nam	<ul style="list-style-type: none"> National Green Growth Strategy for the period 2011-20 with a vision to 2050 National Action Plan on Green Growth for Period 2014-20 	<ul style="list-style-type: none"> Sustainable Development Strategy for 2011-20 	<ul style="list-style-type: none"> National Strategy on Climate Change for 2011-20

Notes: a. Brunei Darussalam's medium-term National Development Plan was not available online, hence it has not been reviewed as part of this exercise.

b. Singapore does not have a medium-term national development plan, but it does have sectoral strategies.

Box 2.1. Green growth strategies in Cambodia and Viet Nam

Cambodia was the first ASEAN country to develop a green growth strategy: the National Green Growth Roadmap of 2009. The plan was developed by an inter-ministerial working group led by the Ministry of Environment, and received technical assistance from the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Regional Helpdesk on Sustainable Consumption and Production for Asia and the Pacific. The roadmap focuses on access to essential resources for all, including to water, agriculture, sustainable land use, renewable energy and energy efficiency, information and knowledge, means of better mobility and finance and investments (UNESCAP, 2009). Based on these seven access objectives, a National Green Growth Master Plan is currently being developed to outline the implementation plan to deliver better outcomes (Mohammed et al., 2013).

More recently, **Viet Nam** produced the National Green Growth Strategy for the period 2011-2020, with a vision to 2050, and in March 2014 approved the National Action Plan on Green Growth for the Period 2014-2020. Notably, the strategy is legally binding and was approved by the Prime Minister, after being developed by an inter-ministerial working group led by the Ministry of Planning and Investment, which is also in charge of the national development plan. The United Nations Development Programme (UNDP), bilateral and multilateral development co-operation providers were also consulted through workshops. Moreover, the National Action Plan on Green Growth designates the Ministry of Finance to develop a framework to mobilise finance for the implementation of the strategy equally from the national budget and international sources. Thus, the strategy is backed by high-level leadership, full country ownership and engagement of national ministries. According to a recent progress report, the strategy is being implemented and is on track to reach the twin objectives of doubling GDP *per capita* compared to 2010 levels, reducing energy consumption per unit of GDP by 1.5-2% per year, and reducing the intensity of greenhouse gas emissions per unit of GDP by 8-10%. The strategy notes that the reduction could amount to 16-20% with international support.

Sources: Mohammed, et al. (2013); G20 Development Working Group (2013); UNESCAP (2009).

Mainstreaming green growth objectives into national development plans is challenging

While integrating green growth objectives into national development plans is vital for coherent national policy making and budgeting for the green growth transition (OECD, 2013a; OECD 2006; European Commission 2013; Global Climate Change Alliance 2013), green growth strategies pose challenges to national development planning for two main reasons:

1. National development plans tend to have a medium-term time horizon, around five years, while national green growth strategies should have a longer timescale, such as 20 years (OECD, 2011). The transition towards green growth might impose costs in the short term and deliver most of the benefits over the long term. Thus, green growth strategies should adopt a long-term perspective and consider the well-being of future generations, while also considering the distribution of costs and benefits across all stakeholders in the short term. In the attempt to address this problem, both Cambodia and Viet Nam's green growth strategies have targets and a schedule for implementation in the short, medium and long term (Cambodia Ministry of Environment, 2009; Viet Nam Government, 2012a; Viet Nam Government, 2012b).

2. Green growth – like climate change – straddles several policy areas; mainstreaming them into national development plans requires the management of cross-sectoral co-benefits and trade-offs with other national priorities (OECD, 2013a). Of these, poverty alleviation, food and energy security are especially important for Southeast Asia.

Despite these challenges, some green growth objectives are being incorporated into long-term national development visions in ASEAN countries regardless of their level of development. For example, Thailand's Vision 2027 includes such general desires as, "people live and enjoy a safe and sound environment" and "processes of production are environmentally sound, and food and energy are secure" (Thailand National Economic and Social Development Board, 2011). The Indonesian National Long-Term Development Plan (RPJPN) Year 2005-2025 aims to "improve the management of natural resources and the environment to support the quality of life", recognising that "the long term sustainability of development will face the challenges of climate change and global warming which affect activities and livelihoods" (Indonesia, Republic of, 2004). In Brunei Darussalam, where *per capita* income is one of the highest in Asia, the Wasawan Brunei National Vision 2035 envisages "an environmental strategy that ensures the proper conservation of our natural environment and cultural habitat. It will provide health and safety in line with the highest international practices" (Brunei Darussalam Government, 2008). Myanmar, categorised by the United Nations as a least developed country, envisages becoming a modern, developed and democratic nation that makes the most of its "latecomer's advantage" to achieve green growth by 2030 (Myanmar, Republic of the Union of, 2012).

2.2. Green growth is increasingly integrated into ASEAN national development plans

Beyond these general green visions, however, to what extent are specific green growth objectives actually included in medium-term plans? This section reviews existing national development plans (listed in Table 2.2) in all the ASEAN countries (except Brunei Darussalam and Singapore)² to examine the extent to which green growth-related priorities and challenges have been mainstreamed. In addition to national development plans, Viet Nam's green growth strategy (Viet Nam Government, 2012a) and Singapore's sustainable development blueprint (Singapore Ministry of the Environment and Water Resources and Ministry of National Development, 2009) were also reviewed, based on the assumption that as these plans were led or co-led by the ministry of planning in each country, their objectives could be considered to be mainstreamed. The plans were reviewed for the following green growth objectives:

- natural resources management, including forest and land management as well as energy and minerals extraction
- air, water and waste pollution
- green technology and energy efficiency
- climate change adaptation and mitigation.

To address the fact that poverty alleviation needs to be an important aspect of green growth in most Southeast Asian countries, the review also considered the role that food and energy security play in national development plans.

The review finds that Southeast Asian countries vary in the extent to which they have mainstreamed green growth objectives into national development plans (Table 2.3). Most countries recognise that adaptation to climate change; sustainable forest and land

Table 2.2. National development plans reviewed for this study

Countries ^a	Plan title
Cambodia	National Strategic Development Plan Update 2009-2013
Indonesia	National Medium-Term Development Plan (RPJMN) 2010-2014
Lao PDR	7th National Socio-Economic Development Plan 2011-2015
Malaysia	Tenth Malaysia Plan 2011-2015
Myanmar	Framework for Economic and Social Reforms (FESR) 2012-2015 ^b
Philippines	Philippine Development Plan 2011-2016
Singapore	Singapore Sustainable Development Blueprint ^c
Thailand	11 th National Economic and Social Development Plan 2012-2016
Viet Nam	Socio-Economic Development Strategy 2011-2020 Viet Nam National Green Growth Strategy for the period 2011-2020 (with a vision to 2050)

Notes: a. Brunei Darussalam's medium-term National Development Plan was not available online, hence it has not been reviewed as part of this exercise.

c. According to personal correspondence with Margit Molnar, OECD Development Centre, Multi-dimensional Investment Review Team, the FESR is the plan for the transitional period of the Comprehensive Development Plan, to be completed in 2014.

b. Singapore does not have a medium-term national development plan, but it has sectoral strategies.

Sources: Cambodia, Royal Government of (2009), *National Strategic Development Plan Update 2009-2013*, Royal Government of Cambodia, Phnom Penh; Indonesia Ministry of National Development Planning (2010), *Second National Medium-term Development Plan (RPJMN) 2010-2014, Book I National Priorities*, Ministry of National Development Planning/National Development Planning Agency, Jakarta; Lao PDR Ministry of Planning and Investment (2011), *The Seventh Five-year National Socio-Economic Development Plan 2011-2015*, Ministry of Planning and Investment, Vientiane; Malaysia Economic Planning Unit (2010), *Tenth Malaysia Plan 2011-2015*, Economic Planning Unit Prime Minister's Department, Putrajaya; Myanmar, Republic of the Union of (2012), *Framework for Economic and Social Reforms – Policy Priorities for 2012-15 towards the Long-Term Goals of the National Comprehensive Development Plan* (draft), Republic of the Union of Myanmar, Nay Pyi Taw; Philippine National Economic and Development Authority (2011), *Philippine Development Plan 2011-2016*, National Economic and Development Authority, Pasig City; Thailand National Economic and Social Development Board (2011), *The Eleventh National Economic and Social Development Plan 2012-2016*, National Economic and Social Development Board, Office of the Prime Minister, Bangkok; Viet Nam Government (2011a), *Viet Nam's Socio-economic Development Strategy for the Period of 2011-2020* (unofficial translation by www.economica.vn), Socialist Republic of Viet Nam, Hanoi.

management; and air, water and waste pollution are important to national development. A “no” in Table 2.3 indicates that the objective did not appear in the plan – although it may have been listed as a challenge (but with no details on how to address it) – or may appear in a stand-alone sectoral strategy. A “yes” indicates that the objective appeared in the plans and is thus considered mainstreamed. Some countries consider environmental sustainability together with energy or agricultural development, while other countries mainstream green growth and climate change into a broader range of sectors by addressing cross-cutting challenges. For example, climate change adaptation is included in four sectors in the Philippines' national development plan (Box 2.2), but in some other countries it only appeared in the environment element of the plan.

Table 2.3. Green growth objectives in Southeast Asian countries' national development plans

	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Resilience to natural disasters/adaptation to climate change	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sustainable forest and land management	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Renewable energy	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Air pollution, water pollution and waste	Water	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Energy security	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes
Food security	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Sustainable fossil fuel and minerals extraction	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes
Green technology	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Energy efficiency	No	Marginal	Marginal	Yes	No	Yes	Yes	Yes	Yes
Climate change mitigation	No	Yes	No	Yes	No	No	No ⁰	No	Yes

Note: While other documents in Singapore consider climate change mitigation as a key priority, Singapore's *Sustainable Development Blueprint* (reviewed here) includes no specific objectives or strategies for reducing greenhouse gas emissions. The medium-term development plan for Brunei Darussalam was not available online. In addition to medium-term national development plans, two green growth plans led by Ministries of Planning were reviewed: Singapore Sustainable Development Blueprint (2009); Viet Nam National Green Growth Strategy for the period 2011-2020 with a vision to 2050.

Sources: Cambodia, Royal Government of (2009), *National Strategic Development Plan Update 2009-2013*, Royal Government of Cambodia, Phnom Penh; Indonesia Ministry of National Development Planning (2010), *Second National Medium-term Development Plan (RPJMN) 2010-2014, Book I National Priorities*, Ministry of National Development Planning/National Development Planning Agency, Jakarta; Lao PDR Ministry of Planning and Investment (2011), *The Seventh Five-year National Socio-Economic Development Plan 2011-2015*, Ministry of Planning and Investment, Vientiane; Malaysia Economic Planning Unit (2010), *Tenth Malaysia Plan 2011-2015*, Economic Planning Unit Prime Minister's Department, Putrajaya; Myanmar, Republic of the Union of (2012), *Framework for Economic and Social Reforms – Policy Priorities for 2012-15 towards the Long-Term Goals of the National Comprehensive Development Plan* (draft), Republic of the Union of Myanmar, Nay Pyi Taw; Philippine National Economic and Development Authority (2011), *Philippine Development Plan 2011-2016*, National Economic and Development Authority, Pasig City; Singapore Ministry of the Environment and Water Resources and Ministry of National Development (2009), *A Lively and Liveable Singapore: Strategies for Sustainable Growth, Singapore Sustainable Development Blueprint*, Ministry of the Environment and Water Resources and Ministry of National Development, Republic of Singapore, Kuala Lumpur; Thailand National Economic and Social Development Board (2011), *The Eleventh National Economic and Social Development Plan 2012-2016*, National Economic and Social Development Board, Office of the Prime Minister, Bangkok; Viet Nam Government (2011a), *Viet Nam's Socio-economic Development Strategy for the Period of 2011-2020* (unofficial translation by www.economica.vn), Socialist Republic of Viet Nam, Hanoi; Viet Nam Five-Year Socio-Economic Development Plan (SEDP) 2007-2010; Viet Nam Government (2012a), *Viet Nam National Green Growth Strategy for the period 2011-2020 with a vision to 2050*, Socialist Republic of Viet Nam, Hanoi.

Resilience to climate change and other natural disasters is well integrated in national development plans

The review of Southeast Asian national development plans reveals that resilience to climate change and other natural disasters is the most commonly mainstreamed green growth objective. Every country is enhancing its resilience as part of its medium-term national development plan. One major difference across national strategies is the extent to which climate change has been identified as a cause of current and projected natural disasters, and the extent to which adaptation and resilience have been integrated into all relevant sectors, not just the environmental sector. The Philippines Development Plan in particular stands out for the degree to which it mainstreams climate change adaptation and resilience to natural disasters across different sectoral strategies (Box 2.2).

Box 2.2. Mainstreaming climate change adaptation in the Philippines

The Philippines Development Plan 2011-2016 mainstreams resilience to climate change and natural disasters into sectoral strategies for agriculture, infrastructure, environmental protection and energy (Philippine National Economic and Development Authority, 2011):

- **Agriculture:** In the strategy for a Competitive and Sustainable Agriculture and Fisheries Sector, increasing resilience to climate change risks is one of three identified goals, in addition to increasing agricultural income and food security, and enhancing policy environment and governance. In addition, climate-responsive agriculture is a sectoral objective and food security is the first priority of the National Framework Strategy on Climate Change 2010-2022 (NFSCC) (Philippines Office of the President, 2010). A legislative agenda has also been proposed to support the strategy, in addition to the existing Climate Change Act (2009) and the People's Survival Fund Law which enacts climate action.
- **Infrastructure:** As part of the cross-cutting strategy for Accelerating Infrastructural Development, resilience to climate change is mainstreamed into the sector strategies on transport, water, energy and social infrastructure.
- **Environmental protection:** The strategy for environmental protection aims to enhance resilience of natural systems as well as to improve their capacity to cope with environmental hazards and climate related risks, through enhancing the adaptive capacity of institutions, communities and ecosystems.
- **Energy:** The Philippines is the only country whose energy strategy also identifies adaptation actions for energy security, namely to assess the vulnerability of existing hydropower plants to the impacts of climate change, and to assess the vulnerability of energy facilities to natural disasters caused by periodical oscillations due to El Niño and La Niña, as well as man-made climate change.

Disaster risk outcomes and goals have been further included, albeit less explicitly, in the strategies for industry and services, social development, and peace and security.

Sources: Philippines Office of the President (2010 and 2011); Philippine National Economic and Development Authority (2011).

In a number of countries, resilience to natural disasters is linked to objectives for early warning systems and food security. In Lao People's Democratic Republic (hereafter "Lao PDR"), the environmental protection strategy is a standalone strategy within the national development plan. It aims to increase food security and agricultural production, and to

adapt to climate change and manage disasters more effectively by taking precautionary measures for disaster risk management, such as the establishment of early warning systems, weather forecast and hydrologic stations and systems. The strategy was legally reinforced in 2012 by the Environmental Conservation Law. Laos' National Strategy on Climate Change mainstreams climate change into the 7th National Socio-Economic Development Plan through the integrated objective of increasing resilience of key economic sectors, including agriculture and food security, forest and land use change, water, energy and transport, industry, urban development and public health. Indonesia's National Medium-Term Development Plan (RPJMN 2010-2014) mainstreams climate change adaptation actions through the strategy on Environment and Management of Natural Disasters. Three early warning systems for tsunami, weather and climate are under development, as well as capacity-building activities in two strategic urban locations of Jakarta and Malang to respond rapidly to natural disasters. In parallel, the strategy for food security also identifies actions for adapting to climate change in the agricultural sector. Indeed, Indonesia's Climate Change Sectoral Roadmap identifies food security as one of the three cross-cutting issues of national importance. Viet Nam's National Strategy on Climate Change 2011-2020 takes an active approach to coping with natural disasters and monitoring climate through early warning systems and increasing food and water security through separate strategic missions.

Some countries prioritise strengthening institutions for climate change adaptation. For instance, Malaysia's national development plan recognises climate change adaptation and mitigation as part of "valuing environmental endowments", one of the ten "big idea" strategies for growing towards a high-income country (Malaysia Economic Planning Unit, 2010). A roadmap and action plan will assess and mitigate climate related risks as part of a climate-resilient growth strategy. Current measures for climate change adaptation include targeted actions to ensure that future infrastructure investments are climate-resilient and to develop country- and sector-specific knowledge on climate modelling. Cambodia has had a Strategic National Action Plan for Disaster Risk Reduction since 2008. The national development plan (Cambodia, Kingdom of, 2009b) mainstreams climate change by strengthening institutions for climate change and preparing a national climate change strategy. It also contains references to climate change in the commitments on environment, education, transport, water resources and agriculture.

Natural disasters and climate change adaptation are less well integrated in Thailand and Viet Nam. They are only addressed in their national development plans under the environment sectoral strategy (Thailand National Economic and Social Development Board, 2011; Viet Nam Government, 2011a). Thailand aims to increase resilience to climate change as part of its environmental strategy for *Managing Natural Resources and Environment toward Sustainability*, while Viet Nam's strategy to *Protect and Improve Environmental Quality, Actively and Effectively Deal with Climate Change* aims to prevent damage from natural disasters and climate change, especially from sea level rise, through fostering work on research, weather forecasting and evaluation. As part of Myanmar's Framework for Economic and Social Reforms, the *Workers' Rights and Social Protection Policy* plans to increase readiness to address natural disasters and to prepare a natural disaster preparedness and prevention plan, although the plan does mention the impact of climate change on natural disasters (Myanmar, Republic of the Union of, 2012).

Few countries include climate change mitigation objectives in national development plans

Only three ASEAN countries (Indonesia, Malaysia and Viet Nam) have included climate change mitigation as one of their national development objectives (see Box 2.3 for Indonesia's approach). These countries have created cross-sectoral strategies to curb emission volumes and intensity (Indonesia Ministry of National Development Planning, 2010; Malaysia Ministry of Natural Resources and Environment 2010; Viet Nam Government, 2014) (and see Box 2.8). These strategies emphasise climate change mitigation in the forestry, energy, agriculture and fisheries sectors, albeit to varying extents. The generally poor mainstreaming of climate change within countries' national plans is surprising, given that every ASEAN country's climate change strategy addresses mitigation. It may indicate that climate change mitigation is not a development priority in most ASEAN countries, despite the sharp increase in greenhouse gas emissions in Southeast Asian countries (see Chapter 1).

Box 2.3. Indonesia's cross-sectoral climate change mitigation plans

In order to shift to a low-carbon development pathway, Indonesia has made a national commitment to mitigate climate change. The Presidential Regulation on National Action Plan for the Reduction of Greenhouse Gas Emissions (Indonesia, 2011) aims to reduce greenhouse gas emissions by 26% by 2020 (or by 41% with international support) compared with business as usual. As a roadmap to implementation, the First Mitigation Fiscal Framework identifies 50 mitigation actions across 5 broad sectors between 2011 and 2020.

Sources: Indonesia Ministry of Finance (2012); Indonesia, Republic of (2011).

Sustainable forest and land management goals are thoroughly integrated in national development plans

Sustainable forest management can promote long-term development and combat climate change. Sustainable forest management is mentioned as a development priority in all the national development plans except for Singapore, suggesting that deforestation and forest degradation are common concerns across the ASEAN region.

The Philippines and Thailand have identified shrinking forest cover as a source of natural resource depletion and a national challenge to sustainable natural resource management (Philippine National Economic and Development Authority, 2011; Thailand National Economic and Social Development Board, 2011). The Philippines views sustainable management of forests and watersheds as one means for promoting national development, to be achieved through improved conservation, protection and rehabilitation of forested land. The Philippines Development Plan 2011-2016 sets the goal of sustainably managing 15 million hectares of forested land, 50% of which may be used for forest products, and aims to increase forest cover from 24% to 30% of its total land area by 2016. In Lao PDR, sustainable forestry has been integrated into national planning since 2005 (Lao PDR Ministry of Planning and Investment, 2011). The 7th Five-year National Socio-Economic Development Plan 2011-2015 also aims to balance the resettlement of marginal communities and forest protection, as they represent competing demand for land.

Cambodia, Lao PDR and Viet Nam also include quantitative reforestation targets in their national development plans, measured as the share of land area covered by forests. Indonesia

seeks to increase forest restoration to a rate of 500 000 hectares per year (Indonesia Ministry of National Development Planning, 2009; Indonesia Ministry of Finance, 2012). In Indonesia's national development plan (Indonesia Ministry of National Development Planning, 2010), sustainable forest management is linked to climate change mitigation through the strategy for Environment and Management of Natural Disasters. It supports reforestation through enhancing co-operation and optimising funding sources such as the IHPH (Forest Utilisation Right Fee), the PSDH (Forest Resources Fee), and the Reforestation Fund. It also aims to reduce deforestation more quickly, to reduce the total number of forest fire hotspots by 20% every year, and to promote the rehabilitation of forests and peat land.

Southeast Asian countries are well aware of the link between deforestation and forest degradation and rising CO₂ emissions. In response to this challenge, they are implementing, or plan to implement, UN Reduced Emissions from Deforestation and Forest Degradation (REDD) programmes. Cambodia, Indonesia, Lao PDR, Malaysia and Viet Nam have already developed and implemented these programmes and REDD task forces exist in Lao PDR and Myanmar (Cambodia Ministry of Agriculture, Forestry and Fisheries, 2010; REDD desk, 2013; Indonesia Ministry of National Development Planning, 2010; Lao PDR Ministry of Planning and Investment, 2011; Viet Nam Government, 2011a; Viet Nam Government, 2007). For more on REDD programmes in the region, see Chapter 3.

Renewable energy is a clear development priority

Every ASEAN country (except Myanmar) has mainstreamed renewable energy objectives into their national development plan. For example, Indonesia's energy strategy (contained in the National Development Plan 2010-2014) aims to increase the use of renewable energy: geothermal energy is to reach 2 000 MW in 2012 and 5 000 MW in 2014; electricity is to be generated from coal-bed methane; and solar power and micro-hydro power (as well as nuclear power) will be phased in. The plan also aims to reduce national greenhouse gas emissions intensity by facilitating the conversion from oil to gas in households and urban public transport, and industrial reuse of crude oil and gas by-products. To help implement the plan, state-owned enterprises are being restructured and the authority for energy policies is being placed in the Presidential Office, which will oversee and promote an integrated approach in accordance with the National Energy Master Plan (Indonesia Ministry of National Development Planning, 2010). In the Philippines, the strategy for accelerating infrastructure development promotes the development of renewable energy technologies to support low-carbon, climate-resilient development, in part through encouraging the uptake of electric vehicles (Philippine National Economic and Development Authority, 2011).

Some ASEAN countries have developed technology-specific strategies for renewable energy in their national development plans, depending in part on their renewable energy source endowment. In Thailand, for example, the strategy for strengthening the agricultural sector, food and energy security aims to increase electric power and heat from biomass, biogas and solid waste by raising awareness, promoting the uptake of existing technologies and investing in research to develop bio-energy technologies using non-food sources (Thailand National Economic and Social Development Board, 2011). The national plan also integrates targets from the 10-year Renewable and Alternative Energy Development Plan 2012–2021. These include renewable energy targets of 25% in total energy consumption and 10% in electricity consumption (Thailand Ministry of Energy, 2012a). Benefitting from their natural endowment and proximity to the Mekong River, Lao PDR and Cambodia rely heavily on hydropower. Lao PDR's 7th National Socio-economic Development Plan 2011–2015 intends to increase power generation in large-scale hydropower stations along the Mekong River (Lao PDR Ministry of Planning and Investment, 2011).

Recognition of the need to address pollution and waste is common

Pollution is a key challenge to green growth in Southeast Asian cities (Chapter 4). The region's more urbanised countries – Indonesia, Malaysia, the Philippines, Singapore, Thailand and Viet Nam – prioritise actions to reduce local air pollutants and to manage waste more sustainably. However, when pollution control measures are only discussed within sectoral environmental strategies (e.g. strategies on sustainable natural resource management, environmental protection and conservation) their contribution to increased economic output and productivity growth may not be fully recognised (see Chapter 4). One exception is Malaysia, which plans to manage solid waste and protect rivers from pollution as part of its strategy for providing efficient public utilities and services and through the development of a long-term strategy for integrated water resource management to achieve water security (Malaysia Economic Planning Unit, 2010). Another exception is Cambodia, where sustainable waste and water management have been mainstreamed into national development planning through co-ordination of the Ministry of Water Resources and Meteorology and nine other ministries.³ Similarly, waste management has been identified as a priority for green growth in the Phnom Penh Municipality, as a strategy for building eco-villages and minimising the transmission of waterborne diseases. Cambodia is preparing laws on water pollution control and on solid waste management to provide a legal framework for enforcement (Cambodia, Kingdom of, 2009b).

Thailand and Indonesia have adopted an integrated approach to controlling and managing local pollution by linking it with co-benefits for greenhouse gas emission reduction. To address issues of pollution caused by infected waste, reduced river water quality and increased carbon dioxide emissions, Thailand's strategy to sustainably manage natural resources and the environment aims to control and reduce air pollution and toxic waste pollution. In Thailand's National Development Plan, actions to reduce pollution include reusing solid waste and agricultural by-products to produce bioenergy and increase energy security, with the co-benefits of reducing greenhouse gas emissions. Other mainstreaming actions proposed include the introduction of an environmental tax to provide incentives for efficient use of natural resources and pollution reduction, to avoid pollution havens by setting minimum environmental standards for trade across ASEAN countries, and to promote green production and consumption to reduce greenhouse gas emissions and local pollution (Thailand National Economic and Social Development Board, 2011). The Indonesian national development plan's Environment and Management of Natural Disasters strategy aims to support sustainable economic growth and greater welfare by reducing water pollution, the risk of forest fires and the environmental degradation of watersheds (Indonesia Ministry of National Development Planning, 2010).

Viet Nam's Socio-economic Development Strategy for 2011-2020 aims to restore environmental quality in heavily polluted areas, as well as to decrease urban air pollution and waste from business and manufacturing, and to improve industrial wastewater management through measurable and concrete targets. The Viet Nam National Green Growth Strategy provides an action plan for reducing air pollution, solid waste and wastewater in urban areas, in part through the strategic objective of greening lifestyles and promoting sustainable consumption. The Law on Environmental Protection (2005) supports the enforcement of the strategy. In the Philippines, improving environmental quality for a cleaner and healthier environment is one of the three goals of the strategy for the conservation, protection and rehabilitation of the environment and natural resources. The goal consists of an action plan for reducing air pollution in cities, water pollution in rivers, reducing waste generation and improving waste management, and establishing a healthier and liveable urban environment. In the Sustainable Development Blueprint, Singapore plans to enhance the urban environment by reviewing air emission standards,

upgrading industry and transport technologies, considering pricing pollution, improving water quality, improving accessibility for pedestrians and public transport, developing “green” and “blue” spaces, and conserving urban biodiversity.

There is a gradual move towards sustainable fossil fuel and mineral extraction

Over half of ASEAN countries are integrating the sustainable management of fossil fuels and minerals into their national development plans. This reflects a recognition that a growth model that is too reliant on natural resource exploitation and the current rate of natural resource depletion are neither economically nor environmentally sustainable.

For example, Lao PDR’s strategy for energy and mining (within the national development plan), sees energy and mining as a core sector for industrialisation, but also for improving citizens’ living standards. To use resources effectively and to preserve and protect the environment, geological and mineral surveys have been planned to map mineral sites and assess their quantity and quality. The strategy also foresees the development of mineral processing and phasing out of low value-added raw mineral exports. It contains guidelines for regular monitoring and inspections in surveyed areas to ensure compliance with environmental standards. Malaysia’s national development plan identifies the underpricing of fossil fuel and water resources as some of the biggest risks to sustainability, and considers the proper valuation of environmental resources as a solution.

Energy security is key, but could have greener credentials

Energy security is a national priority for all ASEAN countries. Given the rapid rise in energy demand, the primary objective of energy strategies in national development plans is to increase energy supply and strengthen energy security, rather than meeting environmental objectives (Box 2.4). The effect that such an approach may have on climate change and green growth objectives depends critically on the carbon-intensity of the energy mix. In principle, increasing power generation from renewable energy sources can reduce greenhouse gas emissions and increase energy security, given the region’s large renewable energy sources. However, one major obstacle to achieving this is connecting renewable energy power stations to the energy network in a reliable and cost-effective way.

Removing fossil fuel subsidies is an important step towards aligning energy security with green growth objectives (see also Chapter 1). Fossil fuel subsidies remain a barrier to energy security and green growth in the ASEAN region, as they discourage energy conservation and the shift to renewable sources. Subsidies amounted to USD 51 billion in Southeast Asia in 2012, and are particularly prevalent in Indonesia, Malaysia, Thailand, Viet Nam, Brunei Darussalam and Myanmar (IEA, 2013). Efforts to curb subsidies to align with energy strategies are currently underway in Malaysia (Box 2.5). Further initiatives to phase out fossil fuel subsidies are also being considered in Indonesia. However, while the current medium-term development plan pursues energy diversification and access, it does not rely on removing fossil fuel subsidies in planning for energy security. This is despite fossil fuel subsidies being a major challenge to efficient energy use in the country (Indonesia Ministry of National Development Planning, 2010).

Uncertainty surrounding the timing and extent of fossil fuel subsidy removal could deter investment in clean energy technology and in the energy sector more generally. Integrating clear strategies and a timetable for phasing out fossil fuel energy subsidies into national development plans would help dispel any uncertainty and lend credibility to these initiatives nationally and internationally.

Box 2.4. Energy security and national development in the Philippines and Cambodia

Energy security is a challenge for the **Philippines**, which imports 40% of its energy; 80% of these energy imports are oil. Nevertheless, geothermal and hydro energy already make up a significant 32% of its domestic energy supply (IEA, 2013). The Philippines' national development plan pursues energy diversification in its strategy to increase power generation by exploring additional domestic oil and gas resources and coal prospecting areas under the Philippine Energy Contracting Round (PECR) (Philippine National Economic and Development Authority, 2011). This is coupled with ambitious renewable energy development policies, aiming to make the Philippines the world's leader in geothermal energy, one of the world's largest producers of wind power, and a solar manufacturing hub in Southeast Asia, while continuing to harness the country's hydropower and biomass energy potentials. At the core of the energy strategy, the Philippine National Renewable Energy Program (NREP) provides the overall strategic direction and frameworks for achieving these renewable energy targets. Planned actions include investing in R&D for ocean thermal energy conversion, increasing the use of renewable energy-based power generation capacities in line with the country's long-term power generation programme, and harmonising geothermal power development with laws and regulations for the protection of the environment and indigenous people.

In **Cambodia**, the National Strategic Development Plan Update 2008-2013 promotes energy security as part of the development of the energy sector (Cambodia, Kingdom of, 2009b). Like the Philippines, its energy security strategy consists of the diversification of energy resources, as well as the creation of reserve capacity. The Energy Sector Development Plan 2005-2024 guides the development of the energy sector. The plan encourages low-cost electricity generation from domestic energy sources, including hydropower and high-tech power plants for nuclear and non-traditional energy, but also from fossil fuels. The Rural Electrification Master Plan is being implemented to accelerate rural electrification, and this makes renewable energy sources central to power generation. In parallel, new off-shore oil and gas field discoveries have been made in Cambodia since 2004, and preparations for extraction are currently underway (Cambodia, Kingdom of, 2009b). Environmental standards and regulations have been planned coherently with the short-term sustainable development objectives of the National Green Growth Roadmap (2-5 years) to stimulate the economy, create jobs and protect vulnerable groups, while improving environmental sustainability. Although the National Green Growth Roadmap plans to create incentives for green growth in the long term (10-20 years) to contribute to the reduction of national carbon dependency, it does not make recommendations for fossil fuels policy.

Sources: IEA (2013); Philippine National Economic and Development Authority (2011); Cambodia, Royal Government of (2009).

Box 2.5. Combining energy security and sustainability in Malaysia's New Energy Policy

Energy security is an integrated sustainable development concern in Malaysia's New Energy Policy 2011-2015, which sets the strategic objectives of removing fossil fuel subsidies and adopting market-based energy pricing by 2015 in order to move towards environmentally sustainable, inclusive development. The policy aims to simultaneously remove subsidies for electricity and petrol (as well as rice, cooking oil and sugar) by 2015 and provide multi-dimensional social support to the bottom 40% households in rural areas, as well as marginalised social groups with specific needs. Tools for support range from public provision of direct transfers for housing and food benefits to better access to healthcare. The Malaysian government is also encouraging disbursements through non-governmental aid programmes and the participation of "government-linked companies" in corporate social responsibility programmes.

Source: Malaysia Economic Planning Unit (2010).

Food security is a prominent development goal

Food security is mainstreamed into all but two national development plans. The agricultural sector is still the engine of the domestic economy in low and middle-income ASEAN countries (ADB, 2013), and food security is a common preoccupation. In Myanmar for instance, a multi-dimensional action plan under the National Comprehensive Development Plan aims to increase agricultural productivity by increasing government loans and removing barriers to market entrance, improving water management for irrigation, expanding microfinance in rural areas, and promoting sustainable land use and the development of livestock and fisheries. It also includes considerations for minimising the environmental impacts of intensive agriculture (Myanmar, Republic of the Union of, 2012). Viet Nam's Socio-economic Development Strategy (2011-2020) promotes the cultivation of rice and the use of advanced technologies for agriculture, such as biotechnology, while managing trade-offs between agriculture and development in rural areas (Viet Nam Government, 2011a). Thailand's integrated Strategy for Strengthening the Agricultural Sector, Food and Energy Security manages competing demands for land for agricultural production and the cultivation of crops for bio-fuel production.

The relationship between green growth on the one hand, and agriculture and food security on the other, is complex. Agriculture can either cause environmental harm or be an important element of preserving environmental services, as agricultural production both affects and depends on natural resources (land, water and biodiversity). Reconciling green growth with food security and agricultural activities is possible, but requires complementary actions in different policy areas. International experience suggests that Southeast Asian countries should focus on the adverse environmental impacts throughout the whole food chain (OECD, 2013b). A first step will be to phase out subsidies for agricultural fertilisers. They artificially inflate the profitability and productivity of agricultural activities and encourage intensive fertiliser use, which in turn leads to environmental degradation. Research and development, innovation, education and information aimed specifically at the agricultural sector can foster sustainable agricultural productivity and income increases in rural areas in the long run. History and international experience show that innovation and good management practices can boost crop yields and livestock productivity (OECD, 2013b). Reducing waste and post-harvest losses also require attention. For instance, there is large potential for using agricultural waste, especially from palm oil production, to produce energy. The development and deployment of these technologies should be a priority. In Malaysia, for instance, the government, states and business have made progresses in developing a palm oil waste-to-energy facility, which has the potential to be significantly scaled up (Hansen and Nygaard, 2014; Sovacool and Drupady, 2011).

Energy efficiency and green technology are being embraced

Although not included in the review, energy efficiency and support for green technology are recurring themes in several Southeast Asian countries' development plans. By reducing energy consumption, energy efficiency can contribute to economic savings, energy security and climate change mitigation. Thailand, Malaysia and Viet Nam's national development plans in particular stand out for their focus on energy efficiency (Box 2.6).

A number of ASEAN countries from all income levels are recognising that green technologies can provide a cost-efficient lever for low-carbon development in sectors such as energy, transport and buildings, agriculture and urban planning. For example, Myanmar wants to seize the opportunities offered by green technology to bypass industrialised countries' high-carbon development model and instead pursue a sustainable growth path (Myanmar, Republic of the Union of, 2012).

Box 2.6. Energy efficiency in national development plans

Thailand has already improved its energy efficiency, and is now embarking on a long-term strategy laid out in the 20-Year Energy Efficiency Development Plan 2011-2030 (Thailand Ministry of Energy, 2011) and the Thailand Power Development Plan 2012-2030 (Thailand Ministry of Energy, 2012b). These aim to increase urban energy efficiency and to reduce greenhouse gas emissions in the transport and logistics sector, as well as from urban buildings and infrastructure, by supporting behavioural change. The plans encourage switching to public transport, to vehicles that use less emission-intensive energy sources (e.g. natural gas and biofuel) and fuel-efficient driving behaviour.

Singapore is promoting energy and resource efficiency in buildings and public transport through minimum performance standards. These include the Mandatory Energy Labelling Scheme, Minimum Energy Performance Standards, Green Mark Incentive Schemes, Building Retrofit Energy Efficiency Financing (BREEF) scheme, the Zero Energy Building R&D project, and Building and Construction Authority's Green Mark standards at Marina Bay. It is also promoting renewable energy through a mix of policy and market instruments (Singapore Ministry of the Environment and Water Resources and Ministry of National Development, 2009).

Malaysia's New Energy Policy 2011-2015 emphasises energy security and economic efficiency as well as environmental and social considerations (see also Box 2.5). The policy focuses on five strategic pillars, one of which is energy efficiency. It sets minimum energy performance standards for appliances and buildings (e.g. Energy Efficiency Star Rating, SAVE Rebate programme, Low Carbon Footprint Products, Green Building Index), and develops green technologies. Malaysia also sees promoting energy efficiency to encourage productive use of energy as one pillar in its strategy to pursue climate-resilient growth. Energy efficiency in commercial and residential buildings, industry and the transport sector, households and appliances will also be promoted as part of the National Green Technology Policy 2009 (Malaysia Economic Planning Unit, 2010).

Viet Nam's Socio-economic Development Strategy 2011-2020 sets the objective of “decreasing annual energy consumption by 2.5-3% of GDP” nationally, and to achieve savings in using energy. The country also promotes energy efficiency across sectors in its industrial development strategy, by emphasising the development of sectors that promote clean energy and new materials, as well as the application of technologies for saving energy and materials.

Sources: Malaysia Economic Planning Unit (2010); Singapore Ministry of the Environment and Water Resources and Ministry of National Development (2009); Thailand Ministry of Energy (2011 and 2012b); Viet Nam Government (2011a).

Green technologies often need government support – because of the positive benefits to society of new innovations and also because of the very limited external financial resources available to highly innovative start-ups and other businesses. Such support may give new, uncompetitive green technologies the space they need to mature and improve until they can eventually replace the more traditional and polluting technologies. Several ASEAN governments are therefore supporting this sector (Box 2.7).

Box 2.7. Government support for green technology and innovation

Malaysia's approach towards green growth is centred around the concept of sustainable consumption and production, which puts the emphasis on green technological innovation as a way to achieve green growth (Adham et al. 2013). In 2010 the country established a Green Technology Financing Scheme amounting to RM1.5 billion (about USD 350 million) (Malaysia Ministry of Energy, Green Technology and Water, 2012). The scheme issues credit guarantees of 60% for companies developing or using green technology. The Green Lane Policy for Innovative Malaysian Small and Medium Enterprises provides loans with subsidised interest rates, tax exemption and preferential government procurement to companies providing green products and services. Malaysia is also developing environmental certification and labelling schemes that match international standards.

Thailand plans to support private green R&D using loans and tax incentives, as well as by creating learning centres to encourage the application of agricultural technologies with high productivity but low natural resource intensity (Thailand National Economic and Social Development Board, 2011). In both Thailand and **Singapore**, innovative technologies have been developed and used to reduce, re-use and recycle wastewater and solid waste in urban areas (Singapore Ministry of the Environment and Water Resources and Ministry of National Development, 2009; Thailand National Economic and Social Development Board, 2011). Further green technology development will be promoted through investment in R&D and international knowledge sharing platforms.

The **Philippines** National Development Plan 2011-2016 provides support for the development of environmentally-friendly and resource-efficient technologies along the agricultural value chain, in partnership with selected higher education institutions, local government units and businesses. Both countries are investing in R&D for non-food feedstock biofuels. Innovative technologies for sustainable development have also been used elsewhere in the economy.

Viet Nam's National Green Growth Strategy (2011-2020) includes objectives “to conduct research and apply technologies in support of using natural resources efficiently and reducing greenhouse gas emission intensity in response to climate change, and to create green jobs and living standards”.

Some ASEAN countries, however, lend little attention to green industries in their national strategies for technology and innovation. For example, **Indonesia's** medium-term development plan identifies capacity building in science and technology as a strategic priority to increase competitiveness, but does not specifically refer to clean and green technologies. Similarly, **Laos'** strategy for science and technology promotes the development of new and modern technologies, but does not mention technologies for green growth (Lao PDR Ministry of Planning and Investment, 2011).

Sources: Adham, et al. (2013); Indonesia Ministry of National Development Planning (2010); Lao PDR Ministry of Planning and Investment (2011); Malaysia Ministry of Energy, Green Technology and Water (2009 and 2012) Philippines National Economic and Development Authority (2011); Singapore Ministry of the Environment and Water Resources and Ministry of National Development (2009); Thailand National Economic and Social Development Board (2011); Viet Nam Government (2012a).

2.3. Inter-ministerial co-ordination for green growth is improving

Actions on climate change and green growth cover a wide range of policy areas. This means that inter-ministerial co-ordination is crucial for ensuring policy coherence among environmental and non-environmental national priorities. The effective design and implementation of green growth and climate change strategies hinges on setting up effective co-ordination mechanisms.

Co-ordination among different ministries and agencies is all the more important in highly decentralised countries (OECD, 2010; Peters, 1998). Lessons from the effective development co-operation movement⁴ suggest that co-ordination among ministries can also strengthen capacity and help development finance providers support national priorities for green growth and climate change. Co-ordination also avoids fragmentation and helps to harmonise finance. In developed and developing countries alike, the Minister of Environment tends to be responsible for managing environmental policies, but often does not have the same influence on national policies as ministries of finance or planning; thus their capacity to steer reforms or muster the consensus necessary to design and implement climate change and green growth policies is limited (OECD, 2013c; UNDP, 2012).

A number of national governments around the world have already established inter-ministerial co-ordination mechanisms to develop national green growth and climate change policies, and to implement and monitor progress (ODI, 2013; OECD, 2013c). However, in developing countries, inter-ministerial co-ordination on climate change has been limited overall and is proving to be a significant barrier to allocating, disbursing and monitoring financing effectively for adaptation and mitigation actions, as well as to scaling up existing finance (OECD, 2013c). Some ASEAN countries have begun initiatives to identify and track climate-relevant expenditure in the national budget in order to develop a climate fiscal framework. One such exercise, called a Climate Public Expenditure and Institutional Review by the United Nations Development Programme (UNDP), has been conducted in Thailand, Cambodia, Philippines, and is under development in Viet Nam (ODI, 2012a; ODI, 2012b; ODI, 2012c).

National-level green growth co-ordination mechanisms are emerging

Only two countries in Southeast Asia, Cambodia and Viet Nam, have formal inter-ministerial mechanisms for green growth (Table 2.4). These are also the only two countries to have developed national green growth strategies. Viet Nam's National Action Plan on Green Growth will be implemented by the Inter-ministerial Green Growth Co-ordinating Board chaired by the Deputy Prime Minister. It is situated under the National Committee on Climate Change, chaired by Prime Minister. The supporting unit of the Inter-ministerial Green Growth Co-ordinating Board is chaired and hosted by the Ministry of Planning and Investment (Viet Nam Government, 2012a and 2014). In contrast, Cambodia's Inter-ministerial Green Growth Working Group is led by the Ministry of Environment (Mohammed et al., 2013).

These green growth co-ordination mechanisms in Cambodia and Viet Nam have a broad range of functions, including the formulation of national policy documents and monitoring their implementation, and promoting knowledge sharing. Viet Nam's Inter-ministerial Co-ordinating Board leads and co-ordinates the implementation of the green growth strategy. Cambodia's Inter-ministerial Green Growth Working Group has developed national green growth planning documents, and has been playing a major role in raising awareness and understanding of green growth among government officials (Mohammed et al., 2013).

While inter-ministerial mechanisms can improve co-ordination, too many institutions with co-ordinating roles may hinder rather than help a co-ordinated national green growth strategy. For instance, in Cambodia, besides the Inter-ministerial Green Growth Working Group, the King and the Prime Minister issued separate decrees for the establishment of the National Council on Green Growth in October 2012 and its General Secretariat, respectively. In March 2010, the Working Group and the Council adopted the National

Green Growth Roadmap, and were asked to help implement its objectives (OECD, 2013a). Subsequently, three national policy documents were developed: the National Policy on Green Growth, the National Strategic Plan on Green Growth 2013-2030 and the National Green Growth Master Plan, but the differences in their objectives are not clear. As a result, despite multiple inter-ministerial co-ordination mechanisms each with a high-level mandate, inter-sectoral collaboration and co-ordination on green growth is reported to be “very limited” in Cambodia and green growth has yet to become a fully mainstreamed concept for development (Mohammed et al., 2013).

Other ASEAN countries do have co-ordination mechanisms, although they are not strictly linked to a national green growth strategy (Table 2.4). In Singapore, the Deputy Prime Minister chairs the Inter-Ministerial Committee on Sustainable Development, which formulated the Sustainable Development Blueprint, and promotes inclusive green growth by engaging with representatives from the business sector, communities and members of the public (Singapore Ministry of the Environment and Water Resources and Ministry of National Development, 2009). In Malaysia, the Green Technology and Climate Change Council was established in 2009 after the National Green Technology Policy was formulated by the Ministry of Energy, Green Technology and Water and launched by the Prime Minister as a roadmap for integrating green technology into national planning (Malaysia Ministry of Energy, Green Technology and Water, 2012). Subsequently, the Council has been tasked to co-ordinate, monitor and evaluate the implementation of the policy, as well as other green technology and climate change programmes at the national level (Malaysia Ministry of Natural Resources and Environment, 2010).

Table 2.4. **Green growth co-ordination mechanisms in ASEAN countries**

Countries	Inter-ministerial Co-ordination Mechanism
Cambodia	<ul style="list-style-type: none"> • Inter-ministerial Green Growth Working Group • National Council on Green Growth • General Secretariat for Green Growth
Malaysia	<ul style="list-style-type: none"> • Green Technology and Climate Change Council
Singapore	<ul style="list-style-type: none"> • Inter-Ministerial Committee on Sustainable Development
Viet Nam	<ul style="list-style-type: none"> • Inter-ministerial Co-ordinating Board for Implementation of the Green Growth Strategy

Climate change activities are better co-ordinated at the national level

Most ASEAN countries have established mechanisms for inter-ministerial co-ordination on climate change (Table 2.5 and Box 2.8). The level of political commitment to mainstreaming climate change within national development is generally high, though it varies across countries. For example, the president chairs the National Council on Climate Change in Indonesia and the Climate Change Commission in the Philippines, while the prime minister chairs the Green Technology and Climate Change Council in Malaysia and the National Committees on Climate Change in Thailand and in Viet Nam (Indonesia Ministry of National Development Planning, 2009; Philippines Office of the President, 2011; Malaysia Ministry of Natural Resources and Environment, 2010; Thailand Ministry of Natural Resources and Environment, 2012; Viet Nam Government, 2011b). In Cambodia, the National Climate Change Committee is chaired by the Ministry of Environment under the honorary chairmanship of the Prime Minister (GCCA, 2013). The level of leadership is

lower in Lao PDR and in Singapore, where the Deputy Prime Minister chairs the National Steering Committee on Climate Change and the Inter-Ministerial Committee on Climate Change respectively (Lao PDR Department of Environment, 2010; Singapore National Climate Change Secretariat, 2012).

Table 2.5. **Climate change co-ordination mechanisms in ASEAN countries**

Countries	Inter-ministerial Co-ordination Mechanism
Cambodia	<ul style="list-style-type: none"> • National Climate Change Committee • Cambodia Climate Change Alliance • Climate Change Department in the Ministry of Environment
Indonesia	<ul style="list-style-type: none"> • National Council on Climate Change (<i>Dewan Nasional Perubahan Iklim</i> or DNPI)
Lao PDR	<ul style="list-style-type: none"> • National Steering Committee on Climate Change National Disaster Management Committee
Malaysia	<ul style="list-style-type: none"> • Green Technology and Climate Change Council
Philippines	<ul style="list-style-type: none"> • Climate Change Commission
Singapore	<ul style="list-style-type: none"> • Inter-Ministerial Committee on Climate Change
Viet Nam	<ul style="list-style-type: none"> • National Committee on Climate Change

Box 2.8. Examples of climate change co-ordination mechanisms in Southeast Asia

The activities of national climate change co-ordination mechanisms differ across Southeast Asian countries depending on countries' institutional structure and the political leadership such mechanisms enjoy.

In the **Philippines**, the Climate Change Commission has formulated the National Framework Strategy on Climate Change 2010-2022 and a corresponding action plan for implementing the framework (Philippines Office of the President, 2011). This guides local government units in the preparation of their Local Climate Change Action Plans.

Cambodia's Climate Change Strategic Plan and Climate Financing Framework are currently being formulated by the National Climate Change Committee. The committee is also responsible for ensuring that climate change is mainstreamed into sector programmes.

In **Indonesia**, national committees or councils have completed a national climate change strategy in co-ordination with multiple national ministries. For example, in Indonesia, the National Climate Change Committee and National Council on Climate Change prepared the Indonesia Climate Change Sectoral Roadmap (2009) to provide practical, sector specific guidance for mainstreaming climate change into national development planning. The roadmap provides a centralised tool to harmonise climate change policy between the planning and the environment ministries. Prior to this, two national climate change policy documents were issued in the same year. The Indonesian National Action Plan on Climate Change was formulated by the State Ministry of Environment in 2007, to implement the vision of sustainable development in the Long-Term Development Plan 2005-2025. It recognises that "the long term sustainability of development will face the challenges of climate change and global warming which affect activities and livelihood". Simultaneously, the National Development Planning Agency developed the National Development Planning: Indonesia Responses to Climate Change, to provide inputs on integrating climate change into the next National Medium-Term Development Plan (2010-2014).

The Philippines and Lao PDR have mechanisms to co-ordinate climate change adaptation that are distinct from climate change mitigation efforts. In Lao PDR, the National Disaster Management Committee is chaired by the Deputy Prime Minister and Minister of the Ministry of National Defence. In the Philippines, the People's Survival Fund Board for climate change adaptation was established under the People Survival Fund Act (2012). Its aim is to co-ordinate a national approach to increase resilience to climate change. This builds on previous commitments that have been outlined in the Philippine Climate Change Act (2009). However, while these are welcome developments given that Southeast Asia is one of the regions of the world expected to be most affected by climate change, an adaptation-specific approach could overlook important mitigation co-benefits, for instance in the forestry sector. Hence, separate responsible bodies for adaptation and/or mitigation may require further co-ordination.

In other cases, the climate change committee is not the sole body responsible for formulating a national climate change strategy. In Thailand, there are multiple policy documents on national climate change planning, led by different ministries. The Office of Natural Resources and Environmental Policy and Planning (ONEP) prepared the Thailand Climate Change Master Plan 2012-2050 and the National Strategy on Climate Change Management, whereas the National Economic and Social Development Board (NESDB) completed the Master Plan on Climate Change in Thailand 2010-2050. In addition, the National Climate Change Committee was established to formulate the national climate change policy. The National Strategies on Climate Change 2008-2012 and 2013-2017 have also been developed, which have the same timeframe as national development strategies, albeit lagging behind by one year (Thailand 2012a). The multiplicity of national strategies on climate change and the lack of clear differences of purpose among them may reduce transparency and be a barrier to effectively identifying and financing climate change priorities.

2.4. Conclusion: Co-ordinated and coherent action is urgent

ASEAN countries have begun to establish green growth strategies, or aspects of them, and most have already designed climate change strategies. However, only a few countries have integrated green growth objectives into national development plans. The mainstreaming of various climate change and green growth priorities into national development plans is rather asymmetric, as countries tend to focus on climate change adaptation, forestry and land management, and reducing pollution, but put much less emphasis on climate change mitigation. This is understandable given the lack of global co-ordination and agreement on greenhouse gas emissions. In addition, ASEAN countries' efforts to tame emissions would have comparatively little impact on global warming. However, their rapid economic growth means that they – like many other developing and emerging countries – are liable to increase their greenhouse gas emissions rapidly unless they shift to a green growth path now. The first step will be to develop coherent national policies in co-ordination with neighbouring countries and regional partners to address the major cause of climate change, as is already being done to tackle deforestation and forest degradation.

Green growth and climate change priorities need to be coherent with other national priorities in Southeast Asia, such as energy and food security. This will require flanking policies that manage trade-offs and maximise complementarities. For instance, the concern for national energy security is a key driver of the region's reliance on coal as a main energy source. Yet a more intensive use of renewable sources would achieve both energy security and green growth. Scaling up the use of renewables requires large investment and focused policy action: transmission and distribution lines will be needed to connect renewable

power to the grid and ensure reliable and cost effective connections to third-party grids. These policy actions will also need to be taken at regional level to establish, as planned, a common ASEAN energy market and increase regional trade in renewable energy.

Southeast Asian countries have made promising progress on co-ordinating green growth and climate change policies at the national level. Nevertheless, more could be done to improve co-ordination across sectors and with sub-national authorities. In many instances, several government agencies still have overlapping responsibility for green growth and climate change policies. Sometimes, institutions in charge of green growth policy development may not have enough leverage to implement those policies. In other cases, there are multiple co-ordination mechanisms, which may undermine rather than help the development of well-co-ordinated green growth and climate change plans. Finally, areas which overlap or have co-benefits, such as mitigation and adaption, or green growth and climate change, may be under the responsibility of different institutions. This could mean that opportunities to make the most of co-benefits are being lost. Improving co-ordination and bringing green growth to the forefront of national policy making would be a substantial step towards implementing green growth policies successfully and efficiently.

To summarise, the following country recommendations emerge from the review in this chapter:

- develop an overarching strategy for green growth and ensure it is well integrated within current national development plans
- prioritise low-emission development paths and climate change adaptation policies so as to ensure that economic growth does not lead to an increase in the levels of pollution, helps to contain greenhouse gas emissions and reduces the negative impact of climate change
- seek complementarities and synergies among national priorities, such as pursuing energy security through the development of the renewable energy sector so as to promote green growth
- do more to enable joined-up government whereby all relevant departments have clear objectives and responsibilities concerning green growth and therefore work towards the same ends.

Notes

1. The Singapore Sustainable Development Blueprint was formulated in 2009 by the Inter Ministerial Committee on Sustainable Development, jointly led by the Ministry of Environment and Water Resources and the Ministry of National Development, and issued by the Prime Minister. The National Sustainable Development Strategy for Myanmar was developed in 2009 by the National Commission for Environmental Affairs and the Ministry of Forestry, with assistance from the United Nations Environment Programme, Regional Resource Centre for Asia and the Pacific.
2. Brunei Darussalam's medium-term National Development Plan was not available online, hence it has not been reviewed as part of this exercise. Official reference to the 9th National Development Plan (2007-2012) is available on the website of the Brunei Darussalam Economic

- Development Board of the Prime Minister's Office. Singapore does not have a medium-term national development plan, but it has sectoral strategies.
3. Ministry of Agriculture, Forestry, and Fisheries; Ministry of Rural Development; Ministry of Industry, Mines and Energy; Ministry of Environment; Ministry of Land Management, Urban Planning and Construction; Ministry of Women's Affairs; Ministry of Interior; Ministry of Education, Youth and Sports; and Ministry of Tourism.
 4. See the Paris Declaration on Aid Effectiveness and the Global Partnership for Effective Development Co-operation (OECD, 2008; Busan Partnership, 2011).

Bibliography

- Adham, K.N., K., Merle and G. Weihs (2013), *Sustainable Consumption and Production in Malaysia: A Baseline Study of Government Policies, Institutions and Practices*, Economic Planning Unit, Prime Minister's Department, Putrajaya, Malaysia.
- Brunei Darussalam Government (2008), "Vision Brunei 2035", in *Brunei Darussalam Long-Term Development Plan, Wawasan Brunei 2035*, Brunei Economic Development Board, The Prime Minister's Office, Bandar Seri Begawan, available at www.bedb.com.bn/why_wawasan2035.html.
- Busan Partnership (2011), *Busan Partnership for Effective Development Co-operation*, Fourth High Level Forum on Aid Effectiveness, Busan, Republic of Korea, 1 December 2011.
- Cambodia Ministry of Environment (2009), *The National Green Growth Roadmap*, Ministry of Environment, Phnom Penh.
- Cambodia, Royal Government of (2009), *National Strategic Development Plan Update 2009-2013*, Royal Government of Cambodia, Phnom Penh.
- Cambodia Ministry of Agriculture, Forestry and Fisheries (2010), *National Forest Programme 2010-2029*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, available in English (unofficial translation) at www.twgfe.org/Docs/Plans/NFP%20Strategic%20and%20Implementation%20English.pdf.
- Dalal-Clayton, D.B. and S. Bass (2009), *The Challenges of Environmental Mainstreaming: Experience of integrating environment into development decisions and institutions*, International Institute for Environment and Development, London.
- European Commission (2013), Climate Policy Mainstreaming, online briefing, available at http://ec.europa.eu/clima/policies/brief/mainstreaming/index_en.htm, accessed 24 September 2014.
- GCCA (2013), Cambodia Climate Change Alliance, online document, Global Climate Change Alliance, available at www.gcca.eu/national-programmes/asia/gcca-cambodia-climate-change-alliance, accessed 24 September 2014.
- Hansen, U.E. and I. Nygaard (2014), "Sustainable energy transitions in emerging economies: the formation of a palm oil biomass waste-to-energy niche in Malaysia 1990–2011," *Energy Policy*, Vol. 66(C), 666–676.

- IEA (2013), *World Energy Outlook Special Report 2013: Southeast Asia Energy Outlook*, International Energy Agency, Paris.
- Indonesia Ministry of Finance (2012), *Indonesia's First Mitigation Fiscal Framework*, Ministry of Finance, Jakarta.
- Indonesia Ministry of National Development Planning (2010), *Second National Medium-term Development Plan (RPJMN) 2010-2014, Book I National Priorities*, Ministry of National Development Planning/National Development Planning Agency, Jakarta.
- Indonesia Ministry of National Development Planning (2009), *Indonesia Climate Change Sectoral Roadmap (ICCSR) Synthesis Report*, Ministry of National Development Planning/National Development Planning Agency, Jakarta.
- Indonesia, Republic of (2011), *Presidential Regulation of the Republic of Indonesia No. 61. Year 2011 on The National Action Plan for Greenhouse Gas Emissions Reduction (RAN-GRK)*, Republic of Indonesia, Jakarta.
- Indonesia, Republic of (2004), *National Long Term Development Plan (RPJPN), 2005-2025*, Republic of Indonesia, Jakarta.
- Lao PDR Ministry of Planning and Investment (2011), *The Seventh Five-year National Socio-Economic Development Plan 2011-2015*, Ministry of Planning and Investment, Vientiane.
- Lao PDR Department of Environment (2010), *Strategy on Climate Change of the Lao PDR*, Department of Environment, Watershed Resource and Environment Administration, Vientiane.
- Malaysia Ministry of Energy, Green Technology and Water (2012), *The National Green Technology Policy, Government Initiatives & Incentives*, Presentation by Malaysia Green Technology Corporation on behalf of the Ministry of Energy, Green Technology and Water, 26th June 2012.
- Malaysia (2011), *Renewable Energy Act*, Laws of Malaysia, Act 725, 2nd June 2011.
- Malaysia Economic Planning Unit (2010), *Tenth Malaysia Plan 2011-2015*, Economic Planning Unit Prime Minister's Department, Putrajaya, available at www.pmo.gov.my/dokumenattached/RMK/RMK10_Eds.pdf.
- Malaysia Ministry of Natural Resources and Environment (2010), "National Policy on Climate Change", Presentation by the Ministry of Natural Resources and Environment at the *Workshop on Climate Change & Biodiversity: Mobilizing the Research Agenda, 13-14 December 2010*, UKM (National University of Malaysia), Bangi.
- Mohammed, E.Y., S. Wang and G. Kawaguchi (2013), "Making growth green and inclusive: the case of Cambodia", *OECD Green Growth Papers*, No. 2013/08, OECD Publishing, <http://dx.doi.org/10.1787/5k420651szzr-en>.
- Myanmar, Republic of the Union of (2012), *Framework for Economic and Social Reforms – Policy Priorities for 2012-15 towards the Long-Term Goals of the National Comprehensive Development Plan* (draft), Republic of the Union of Myanmar, Nay Pyi Taw.
- ODI (2013), *Tanzania National Climate Change Finance Analysis*, Overseas Development Institute, London.
- ODI (2012a), *Cambodia Climate Public Expenditure and Institutional Review*, draft as of July 2012, Overseas Development Institute, London.

- ODI (2012b), *Philippines Climate Public Expenditure and Institutional Review*, draft as of September 2012, Overseas Development Institute, London.
- ODI (2012c), *Thailand Climate Public Expenditure and Institutional Review*, draft as of July 2012, Overseas Development Institute, London.
- OECD (2013a), *Putting Green Growth at the Heart of Development*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264181144-en>.
- OECD (2013b), *Policy Instruments to Support Green Growth in Agriculture*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264203525-en>.
- OECD (2013c), “What enables effective international climate finance in the context of development co-operation?” *OECD Working Paper*, June 2013, OECD, Paris.
- OECD (2011), *Towards Green Growth*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264111318-en>.
- OECD (2010), *Cities and Climate Change*, OECD Publishing, <http://dx.doi.org/10.1787/9789264091375-en>.
- OECD (2008), *The Paris Declaration on Aid Effectiveness and the Accra Agenda for Action*, OECD, Paris, available at www.oecd.org/dac/effectiveness/34428351.pdf.
- OECD (2006), “Good practices in the national sustainable development strategies of OECD countries”, Sustainable Development Studies, OECD, Paris, available at www.oecd.org/greengrowth/36655769.pdf.
- Peters, B.G. (1998), “Managing horizontal government: the politics of co-ordination”, *Public Administration*, 76(2), 295–311.
- Philippines Office of the President (2011), *National Climate Change Action Plan 2011-2028*, Climate Change Commission, Office of the President, Malacanang, Metro Manila.
- Philippines Office of the President (2010), *National Framework Strategy on Climate Change 2010-2022*, Climate Change Commission, Office of the President, Malacanang, Metro Manila.
- Philippine National Economic and Development Authority (2011), *Philippine Development Plan 2011-2016*, National Economic and Development Authority, Pasig City.
- REDD Desk (2013), “REDD Countries,” REDD Desk website, available at <http://theredddesk.org/countries>, accessed 5 December, 2013.
- Singapore National Climate Change Secretariat (2012), *Climate Change and Singapore. Challenges. Opportunities. Partnerships. National Climate Change Strategy 2012: creating a climate for sustainable growth, securing a liveable environment for our future*, National Climate Change Secretariat, Prime Minister’s Office, Republic of Singapore, Kuala Lumpur, available at <http://app.nccs.gov.sg/nccs-2012/docs/NCCS-2012-Publication.pdf?AspxAutoDetectCookieSupport=1>.
- Singapore Ministry of the Environment and Water Resources and Ministry of National Development (2009), *A Lively and Liveable Singapore: Strategies for Sustainable Growth, Singapore Sustainable Development Blueprint*, Ministry of the Environment and Water Resources and Ministry of National Development, Republic of Singapore, Kuala Lumpur available at http://app.mewr.gov.sg/data/imgcont/1292/sustainableblueprint_forweb.pdf.
- Sovacool, D.K. and I.M. Drupady (2011), “Innovation in the Malaysian waste-to-energy sector: applications with global potential”, *The Electricity Journal*, Vol. 24(5), 29–41.

- Thailand Ministry of Energy (2012a), *Renewable and Alternative Energy Development Plan for 25 Percent in 10 Years (AEDP 2012-2021)*, Ministry of Energy, Bangkok, available at www.dede.go.th/dede/images/stories/dede_aedp_2012_2021.pdf.
- Thailand Ministry of Energy (2012b), *Thailand Power Development Plan 2012-2030, PDP2010: Revision 3, Summary*, Energy Policy and Planning Office, Ministry of Energy, June 2012.
- Thailand Ministry of Energy (2011), *Thailand 20-Year Energy Efficiency Development Plan 2011-2030 (EEDP)*, Ministry of Energy, Bangkok.
- Thailand Ministry of Natural Resources and Environment (2012), *Thailand Climate Change Master Plan 2012-2050*, Office of Climate Change Coordination, the Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment, Bangkok.
- Thailand National Economic and Social Development Board (2011), *The Eleventh National Economic and Social Development Plan 2012-2016*, National Economic and Social Development Board, Office of the Prime Minister, Bangkok.
- UNDP (2012), *Climate Public Expenditure and Institutional Reviews (CPEIRs) in the Asia-Pacific Region: What have We Learnt?* Draft, Capacity Development for Development Effectiveness Faculty for Asia and Pacific, United Nations Development Programme, New York.
- UNESCAP (2009), *The National Green Growth Roadmap*, United Nations Economic and Social Commission for Asia and the Pacific, Phnom Penh.
- Viet Nam Government (2014), *National Action Plan on Green Growth for Period 2014-2020*, Socialist Republic of Viet Nam, Hanoi.
- Viet Nam Government (2012a), *Viet Nam National Green Growth Strategy for the period 2011-2020 with a vision to 2050*, Socialist Republic of Viet Nam, Hanoi, available at www.greengrowth-elearning.org/pdf/VietNam-GreenGrowth-Strategy.pdf.
- Viet Nam Government (2012b), *Viet Nam Sustainable Development Strategy for 2011-2020*, Socialist Republic of Viet Nam, Hanoi.
- Viet Nam Government (2011a), *Viet Nam's Socio-economic Development Strategy for the Period of 2011-2020* (unofficial translation by www.economica.vn), Socialist Republic of Viet Nam, Hanoi.
- Viet Nam Government (2011b), *National Strategy on Climate Change*, Socialist Republic of Viet Nam, Hanoi, www.chinhphu.vn/portal/page/portal/English/strategies/strategies_details?categoryId=30&articleId=10051283.
- Viet Nam Government (2007), *Viet Nam Forest Development Strategy 2006-2020*, Prime Minister's Office, Socialist Republic of Viet Nam, Hanoi, available in English (unofficial translation) at http://theredddesk.org/sites/default/files/viet_nam_forestry_development_strategy_2.pdf.

Chapter 3

Founding green growth on sustainable resource use

Natural resources contribute substantially to the wealth and growth of ASEAN countries. Yet the rate of natural resource depletion across the region is worrying and may eventually prove unsustainable. The precautionary principle dictates the need for a change in current exploitation practices to avoid triggering irreversible damage to the environment that could have large negative long-term consequences for the economy and human welfare. This means finding ways to halt forest loss and degradation, to promote sustainable fisheries and replenish fish stocks, to reverse the increasing reliance on coal and other fossil-fuel based sources of energy and fully exploit the large potential of renewable energy sources, and to encourage the more sustainable exploitation of minerals. The chapter reviews these challenges, and for each provides recommendations for practical ways forward to ensure that key aspects of natural capital are preserved and that their use contributes to long-term economic growth and improvements in well-being. The development and effectiveness of the array of policies and institutions required will hinge crucially on a set of indicators that monitor the quantity, quality and value of natural resources and that will facilitate the implementation of natural capital accounting.

Managing natural resources sustainably is a fundamental component of green growth. The basic aim is to preserve those natural resources and environmental services that are essential to human well-being – such as air and water filtration – and that cannot be replaced by other forms of capital. The sustainable management of natural resources also involves promoting physical and human capital accumulation so as to generate alternative sources of economic growth that will gradually replace the exploitation of non-renewable natural resources, such as minerals.

Southeast Asian countries are richly endowed with natural resources, spanning from oil, gas and minerals to forests, fisheries and a wealth of biodiversity. However, economic growth and rapid urbanisation (see Chapter 4) are exerting ever greater pressure on the region's natural capital, endangering long-term economic growth and threatening to reverse the gains in human well-being made to date.

The ten member countries of the Association of Southeast Asian Nations (ASEAN, also referred to as Southeast Asia in this report) must aim to optimise the long-term benefits of their natural resource use within the context of their economic development needs. They will need to ensure adequate supplies of renewable and non-renewable resources to buttress economic growth, while at the same time minimising any adverse effects on the environment and human health due to the extraction and process of natural resources. They will also need to halt natural resource degradation so as to preserve non-commercial environmental services.

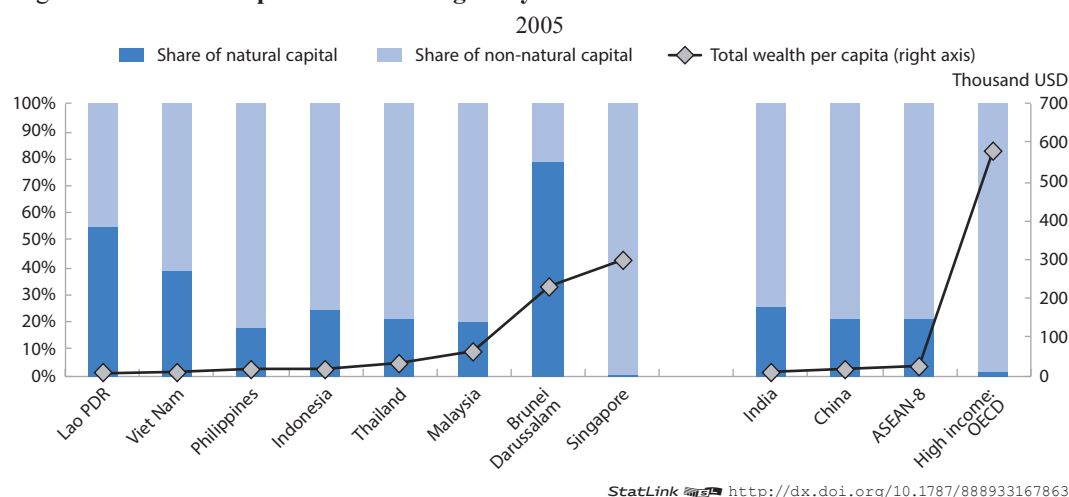
This chapter outlines the importance of natural capital in Southeast Asia's wealth and economic growth. It reviews natural capital exploitation practices for four of the major natural resources in the region – forests, fisheries, energy and minerals – outlining for each a policy framework and the institutions required to move onto more sustainable pathways. It concludes by underlining how the successful design and implementation of policies for sustainably managing natural resources depend on being able to monitor and evaluate the natural assets base. OECD green growth indicators can contribute to this, and eventually to the gradual implementation of the System of Economic and Environmental Accounts (SEEA) in the region.

3.1. Development in Southeast Asia is leading to natural capital depletion

Natural capital accounts for about 20% of the total wealth of the eight ASEAN countries for which data are available (Figure 3.1). The People's Republic of China and India have a similar dependence on natural assets, while high-income OECD countries are much less resource-dependent. Brunei Darussalam is particularly dependent on account of its large hydrocarbon resources.

Changes in total wealth and its components provide a useful gauge of the degree of sustainability of economic growth and natural resource exploitation. The adjusted net savings (ANS), or “genuine savings” index, developed by the World Bank, measures the change in total national wealth, including natural, produced, human and social capital (World Bank, 2006 and 2011).¹ Changes in total wealth (i.e. adjusted net savings) are a measure of sustainability because future consumption and social welfare are constrained by current wealth. The concept of adjusted net savings implicitly builds on the concept of “weak sustainability” as it assumes that natural and other forms of capital are perfect substitutes (Box 3.1). Adjusted net savings are computed from investments in human capital, depletion of natural resources and pollution damage. Negative adjusted net saving rates imply that total wealth is declining, thereby indicating an unsustainable growth model. Strong sustainability instead assumes some of the services natural capital provides are essential to human welfare and can therefore not be replaced by other forms of capital (Box 3.1).

Figure 3.1. Natural capital contributes greatly to the total wealth of Southeast Asia countries



Note: Total wealth per capita (right-hand axis) is in thousands of 2005 USD; non-natural capital includes net foreign assets and intangible (i.e. social) and produced capital; Myanmar and Cambodia are excluded because of lack of data; natural capital comprises crop, pasture land, timber, non-timber forest, protected areas, oil, natural gas, coal, and minerals. ASEAN-8 is the arithmetic average of the countries appearing on the left side of the figure. Higher-income OECD excludes Hungary, Mexico and Turkey.

Source: Author's calculations based on World Bank Wealth of Nations dataset, <http://data.worldbank.org/data-catalog/wealth-of-nations>, accessed March 2014.

Box 3.1. Weak versus strong sustainability in natural resource management

According to the economics literature, the sustainability of natural resource management and use can be defined in two ways:

- The concept of “weak sustainability” assumes that natural and other forms of capital are perfect substitutes: as long as any depleted natural capital is substituted with other forms of capital (i.e. physical, human or social), economic development will be sustainable since the overall capital stock will not decrease (Pearce and Atkinson, 1993; Cabeza Gutiérrez, 1996).
- “Strong sustainability”, on the other hand, views some of the services originating from natural capital as essential to human welfare and irreplaceable by other forms of capital (Ekins et al., 2003; Neumayer, 2013). These “critical natural capital” services include pollination and air and water filtration. In this view, natural capital is prone, more than other forms of capital, to critical thresholds. Passing these thresholds could trigger large, unpredictable and permanent changes that will have profound impacts on social welfare (Arrow et al., 2004). According to the strong sustainability viewpoint, at least a portion of a nation's natural capital resources must be preserved at all times.

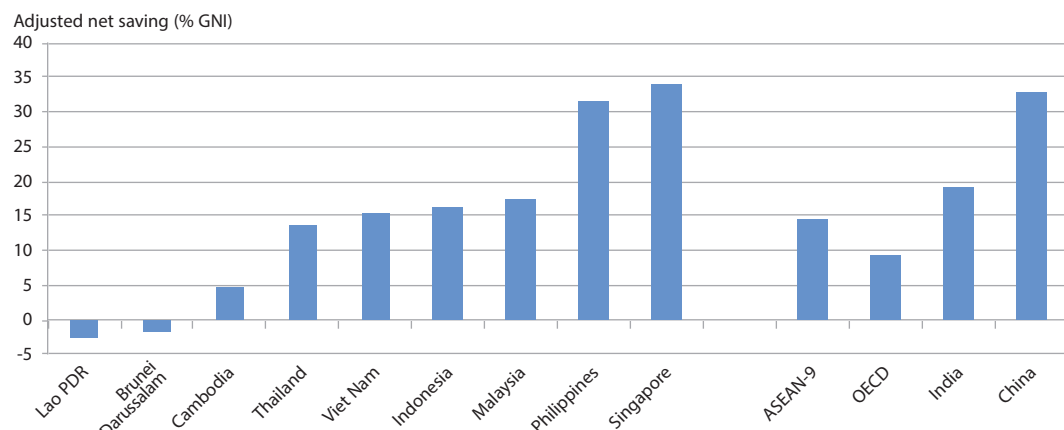
The sustainable management of natural resources requires, at the very least, weak sustainability. Natural resource rents (i.e. excess profits to the natural profit rate) need be invested to accumulate alternative forms of capital so as to offset the decline in the natural capital stock (Hartwick, 1977). Also, weak sustainability requires that natural capital be managed efficiently in the sense that welfare losses from environmental damages are minimised and resource rents arising from the exploitation of natural resources, accounting for environmental externalities, are maximised (Barbier, 2007).

However, today it is increasingly recognised that some aspects of natural capital are essential to long-term human welfare and are not substitutable with other forms of capital (i.e. strong sustainability). Therefore, green growth objectives need be developed and implemented following the strong sustainability concept.

From this point of view, ASEAN countries and China appear to be on a weakly sustainable development path. The average adjusted net saving rates over the 1999-2012 period were positive for all these countries except Brunei Darussalam (Figure 3.2). Singapore recorded the largest adjusted average net saving as a share of gross national income (GNI) over the period. These savings were driven largely by the accumulation of man-made capital, which accounted for more than 90% of the adjusted net savings. The Philippines also showed substantial adjusted net savings – more than 30% of GNI on average during the period; while Thailand Indonesia, Viet Nam and Malaysia recorded yearly average adjusted net savings of around 10-20% of GNI. Cambodia had substantially lower adjusted net savings (at around 5% of GNI), which have been declining over time. Brunei Darussalam and Lao People’s Democratic Republic (hereafter “Lao PDR”) seem to be the two countries on the least sustainable path as their adjusted net saving rates were negative on average driven by their fast fossil-fuel energy sources and mineral depletion.

Figure 3.2. **Growth is only weakly sustainable for most countries**

Yearly average, 2001-2012 (or latest available year)



StatLink <http://dx.doi.org/10.1787/888933167878>

Note: The bars show adjusted net savings; they are a sustainability indicator as they take into account net national savings along with investments in human capital, depletion of natural resources and damage caused by pollution. They are computed by 1) deducting capital consumption from gross national savings – to obtain net national savings; then 2) adding current expenditures on education – as a proxy for human capital accumulation; and then 3) subtracting estimates of the depletion of different kinds natural resources – to reflect the decline in the value of the natural asset base; and finally 4) estimates of pollution damage in the form of health costs due to particulate emissions are also deducted. Adjusted net savings are measured as a percentage of gross national income (GNI); ASEAN-9 is the arithmetic average of the nine ASEAN countries in the figure; data for Myanmar not available.

Source: Author’s calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, September 2014.

The rate of natural capital depletion in Southeast Asia casts doubts on the sustainability of the current development model. Natural capital has been depleted at an increasing rate in most ASEAN countries over the last decade, especially in Brunei Darussalam, Cambodia, Lao PDR and the Philippines, and Viet Nam to a lesser extent (Figure 3.3). In countries with large natural capital deficits, natural capital depletion is mostly attributable to the extraction of non-renewable natural resources (i.e. coal, oil, gas and minerals). For example, between 1999 and 2012, Brunei Darussalam’s natural capital stock was depleted by almost 40% of GNI on average every year, while Viet Nam, Malaysia and Indonesia experienced a yearly average decrease equivalent to nearly 10% of GNI (Table 3.1).

Figure 3.3. In some ASEAN countries natural capital is being depleted at increasing rates

Natural capital depletion (% of GNI)

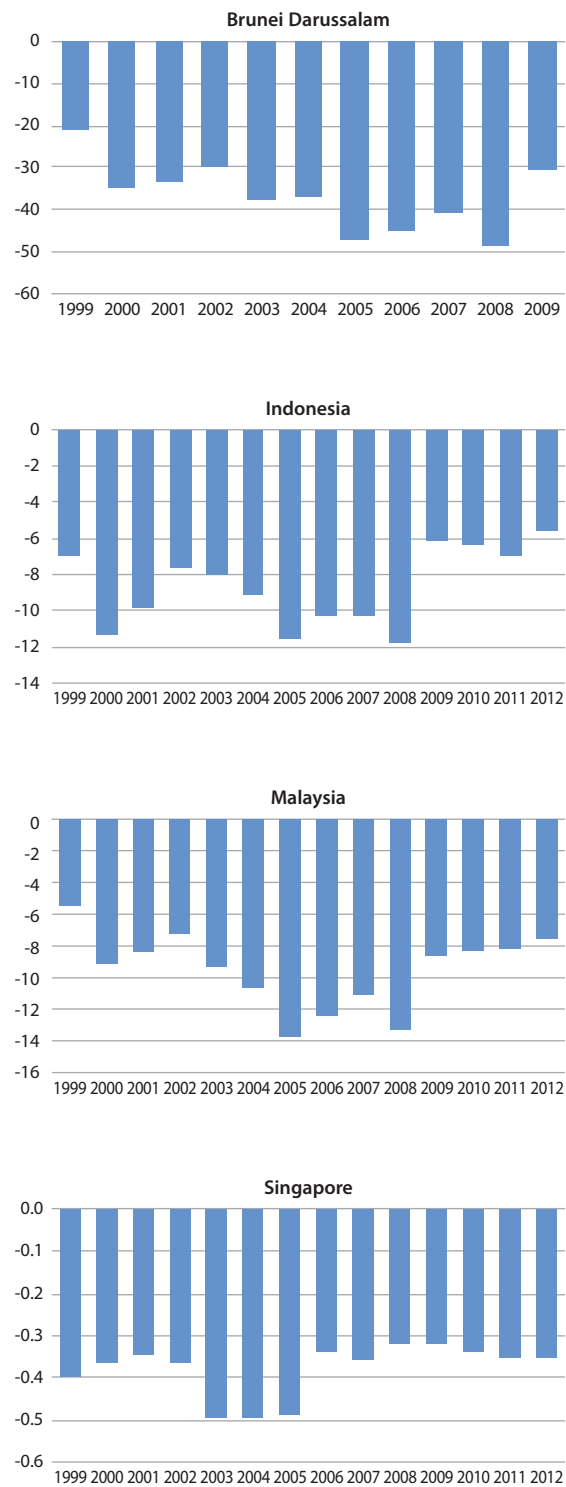
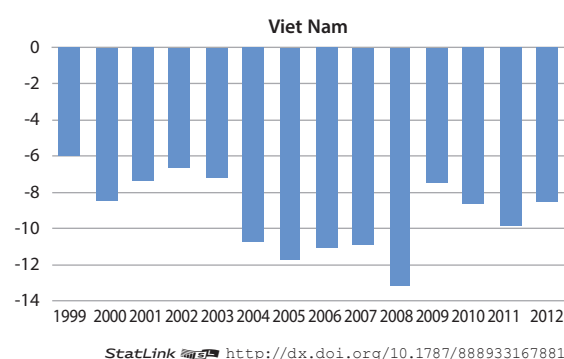


Figure 3.3. In some countries natural capital is being depleted at increasing rates (continued)



Note: Natural capital depletion is computed as the sum of net forest depletion, energy depletion, mineral depletion and particulate emission damage; all components are expressed as % of GDP. Net forest depletion is calculated from unit resource rents multiplied by the excess of roundwood harvest over natural growth. Energy depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil, and natural gas. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate. Data not available for Myanmar.

Source: Author's calculations based on World Bank World Development Indicator, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed September 2014.

Table 3.1. Natural capital is being depleted at different rates across ASEAN countries

Percent GNI, yearly average 2001-2012 (or latest available year)

	Net forest depletion ^a	Energy depletion ^b	Mineral depletion ^c	Total
Brunei Darussalam	0.00	38.88	0.00	38.88
Cambodia	2.20	0.00	0.00	2.20
Indonesia	0.32	6.10	1.29	7.70
Lao PDR	2.90	0.18	4.78	7.86
Malaysia	0.07	8.96	0.07	9.10
Philippines	0.19	0.40	0.92	1.51
Singapore	0.00	0.00	0.00	0.00
Thailand	0.79	3.23	0.03	4.05
Viet Nam	0.94	7.66	0.22	8.82
ASEAN-9 ^d	0.82	7.27	0.81	8.90
OECD	0.00	0.82	0.15	0.97
China	0.07	2.78	1.01	3.86
India	0.99	1.92	0.78	3.68

StatLink <http://dx.doi.org/10.1787/888933168259>

Notes: Figures are the average change in the share of the value of natural capital (and its components) as a percentage of gross national income (GNI); positive figures mean that capital is being depleted.

a. Net forest depletion is calculated from unit resource rents multiplied by the excess of roundwood harvest over natural growth.

b. Energy depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil, and natural gas.

c. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite and phosphate.

d. ASEAN-9 is the arithmetic average of the nine ASEAN countries appearing in the table.

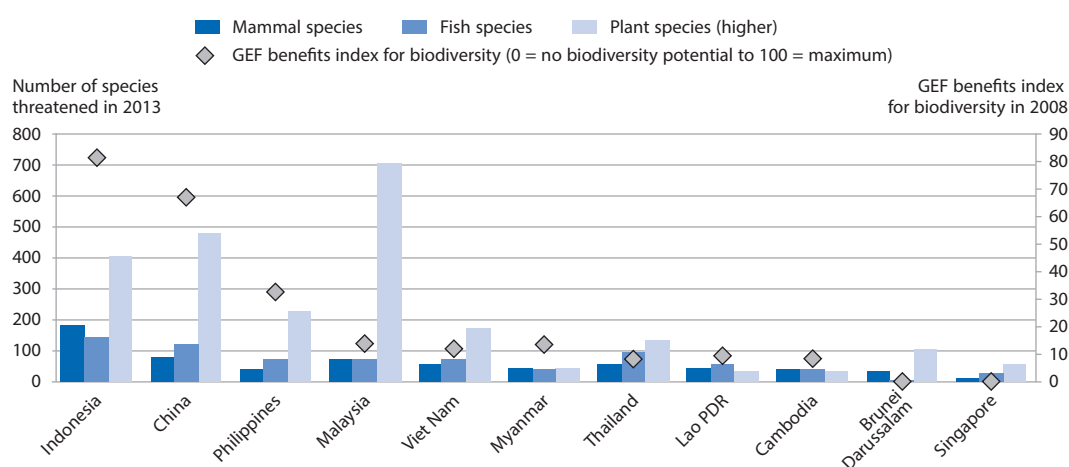
Source: Author's calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed September 2014.

This rate of depletion across the region is worrying and may eventually prove unsustainable. It is in fact increasingly recognised that sustainable management of natural resources must be based on the concept of strong sustainability, as some services that natural capital provides cannot be substituted by other forms of capital, and that they are essential to human welfare (e.g. Arrow et al., 2004). This means that a certain portion of natural capital must be preserved at all times.

However, determining the share of the various natural resources that should be preserved at all times is challenging in the absence of theories and models to predict the critical natural thresholds beyond which fundamental system change or even collapse can occur (Carpenter et al., 2009; Rockstrom et al., 2009). In the presence of these uncertainties, the precautionary principle dictates the need for a change in current exploitation practices in Southeast Asia, to avoid triggering irreversible changes in the environment that could have large negative long-term consequences for the economy and human welfare (Arrow and Fisher, 1974; Epstein, 1980).

For instance, maintaining functioning ecosystem services means sustaining biodiversity (e.g. see TEEB, 2010). This is particularly important in Southeast Asia, which is a highly biodiverse region. The Global Environment Facility (GEF) Benefits Index for Biodiversity² shows the large potential global benefits arising from biodiversity in Southeast Asian countries, especially in Indonesia and to a lesser extent in the Philippines, Malaysia, Viet Nam and Myanmar (Figure 3.4). Yet Southeast Asian countries are particularly at risk of large biodiversity losses (Figure 3.4). Sodhi et al. (2010) estimate that between 13% and 42% of species will be lost in Southeast Asia by 2100, at least half of which could represent global extinctions. Indonesia appears to have the largest number of threatened mammal (almost 200) and fish (almost 150) species, while Malaysia has the largest number of threatened higher plant species (700). The Philippines, Viet Nam and Thailand each have around 300 threatened species.

Figure 3.4. Biodiversity is under threat in ASEAN countries



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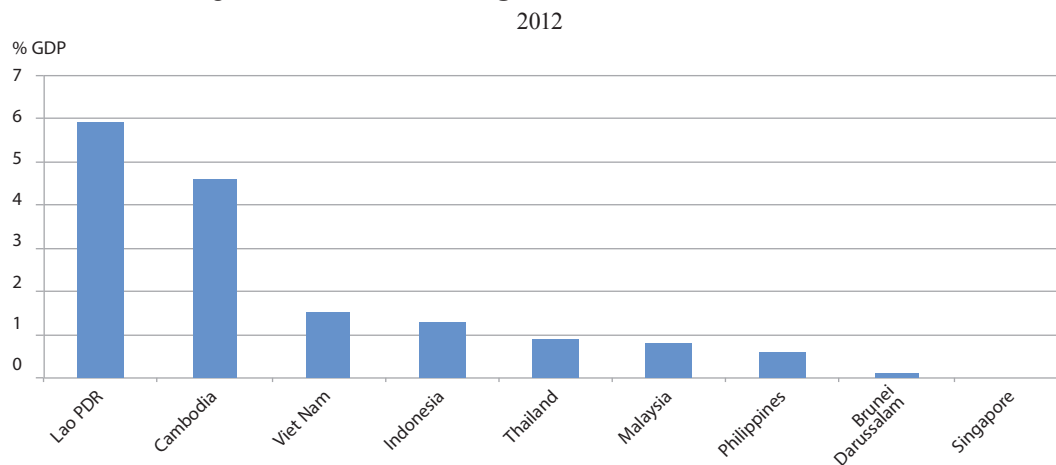
Note: The GEF benefits index for biodiversity is a composite index of relative biodiversity potential for each country based on the species represented in each country, their threat status, and the diversity of habitat types in each country. The index has been normalised so that values run from 0 (no biodiversity potential) to 100 (maximum biodiversity potential). Higher plant species are native vascular plant species.


Source: Author's calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed July 2014.

3.2. Sustainably managed forests are an important source of green growth

Forests represent an important revenue source in some Southeast Asian countries; the production and export of raw wood, furniture and non-timber forest products, as well as commodities from plantation forests, account for a significant share of GDP (Figure 3.5).

Figure 3.5. Forests create significant wealth in Southeast Asia



StatLink  <http://dx.doi.org/10.1787/888933167909>

Note: The bars show forest rents computed as the product of roundwood harvest times average prices and a region-specific rental rate.

Source: Author's calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed July 2014.

The main challenge for sustainable forest management is to strike a balance between the exploitation of forest resources and the preservation of environmental services, social and indigenous values. If this balance is struck, forest use can significantly contribute to Southeast Asian countries' economic growth and poverty reduction objectives, especially in rural areas. By ensuring the maintenance of forests' productive capacity and environmental services over the long term, sustainable management of forests will ensure lasting social welfare improvements.

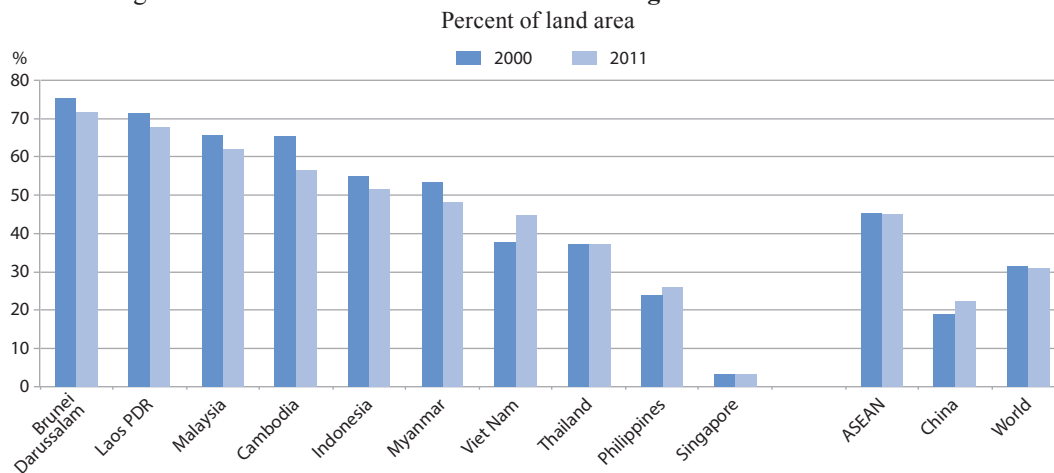
Forest cover and forest quality are decreasing

Across the ASEAN region, forests cover about 45% of the land area, above the world average of 30%. In all, the region's forests account for about 6% of world total forest cover.³ Between 1990 and 2010, however, ASEAN's forests contracted in size by an area greater than that of Viet Nam. Besides undermining the ecosystem services which forests provide and the biodiversity they host, deforestation in Southeast Asia releases particularly high quantities of CO₂ because of peatland degradation. In 2006, CO₂ emissions from peatland drainage in Southeast Asia contributed the equivalent of between 1.3% and 3.1% of CO₂ emissions from the combustion of fossil fuel (Hooijer et al., 2010). If these trends continue, reductions in forest area between 2010 and 2020 might equate to about 8.72 gigatonnes of CO₂ equivalent – almost 20% more than China's total CO₂ emissions for 2005 or, on a mean annual basis, around 85% of total European Union (EU15) transport emissions for 2010 (FAO, 2011).

The last decade (2000 to 2011), has seen forest loss slow down somewhat across the region (Figure 3.6). However, the general regional slowdown masks diverging trends in

individual countries. Forest losses were especially pronounced in Cambodia and Myanmar, where the share of forested land declined by ten or more percentage points. On the other hand, Viet Nam and the Philippines have experienced large forest gains, equivalent to 19 and 8 percentage points of the forest area respectively, partly attributable to afforestation programmes (Figure 3.7).

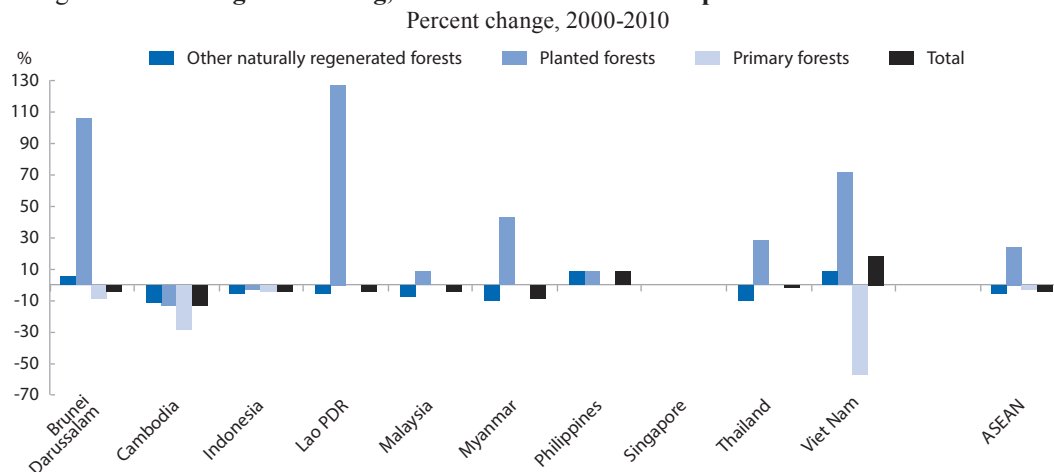
Figure 3.6. The share of forest area is decreasing in most ASEAN countries



StatLink <http://dx.doi.org/10.1787/888933167911>

Source: Author's calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed July 2014.

Figure 3.7. Although increasing, afforestation does not compensate for natural forest loss



StatLink <http://dx.doi.org/10.1787/888933167921>

Source: Author's calculations based on Global Forest Resources Assessment 2010, <https://countrystat.org/home.aspx?c=FOR>, accessed June 2014.

Forest cover is only part of the picture, however. Deforestation is also compounded by forest degradation, as primary forests are being damaged and replaced in part by newly planted forests through afforestation programmes. Some countries promote afforestation through various incentives. For instance, Malaysia grants investment tax allowances for five years and other tax exemptions for ten years for companies undertaking forest plantation projects.⁴ Although these incentives may increase total forest cover or slow down its decline,

they cannot compensate for the environmental damage caused by the loss of primary forest. Newly planted forests do not provide the same ecosystem services as primary forests. For instance, newly planted forests absorb less carbon, at least over the short term, than primary forests (Schulze et al., 2000; Laganière et al., 2010). Also, primary forests are usually more suitable as habitat for a wider range of native forest species than plantation forests, although the latter can in certain circumstances provide valuable habitat and contribute to the conservation of biodiversity (Brockerhoff et al., 2008; Nasi et al., 2008).⁵ Between 2000 and 2010 across the ASEAN region, the decline in primary forest cover and other naturally generated forests was about 3 and 6% respectively, while planted forest cover increased by 24% (Figure 3.7).

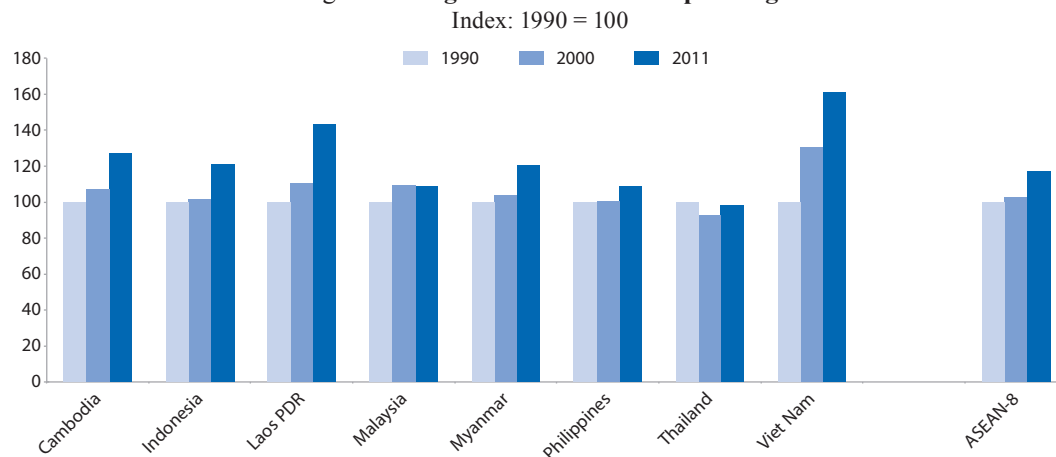
The drivers of deforestation and forest degradation are many

The major causes of deforestation in Southeast Asia include population growth, infrastructure, the expansion of subsistence farming, timber extraction, and large commercial capital-intensive activities such as horticulture and cattle rearing (FAO, 2011).

The most high profile cause of the Southeast Asian countries' loss of natural forest is their conversion to cash crop plantations. Rubber and palm oil plantations are the main crops driving natural forest loss, especially in Indonesia, southern Thailand and southern Myanmar (Stibig et al., 2007). In Indonesia and Malaysia, the conversion of primary forest for the expansion of palm oil and rubber plantations has significantly contributed to deforestation (Miettinen et al., 2011; Boucher et al., 2011; Gibbs et al., 2010). In Indonesia, at least half of the 8 million hectares of currently productive plantations are in areas previously covered by tropical forests (Obidzinski, 2013). However, almost half of the plantations in Indonesia are managed by smallholder farmers, and represent an important source of employment and income for the rural poor (Obidzinski, 2013). Providing alternative sources of income for the rural population is therefore a crucial element to more effective and equitable forest protection policies.

In recent years the expansion of agricultural land has been a more important driver of deforestation than logging (FAO, 2011). However, the recent increase in agricultural land and forest cover in Viet Nam and the Philippines (Figure 3.8) shows that agricultural land expansion is not necessarily inimical to forest protection, as these countries saw forest and agricultural areas both increase over the same period (although forest gains were largely

Figure 3.8. **Agricultural land is expanding**



StatLink <http://dx.doi.org/10.1787/888933167937>

Note: Agricultural land includes arable land, permanent crops, and permanent meadows and pastures.

Source: Author's calculations based on FAOSTAT database, <http://faostat3.fao.org/faostat-gateway/go/to/home/E>, accessed May 2014.

attributable to afforestation programmes). Between 1990 and 2011, eight ASEAN countries expanded their agricultural land by more than 15% (the data exclude Brunei Darussalam and Singapore because of their small agricultural areas). Viet Nam recorded the largest increase (over 60%), followed by Lao PDR (43%) and Cambodia (27%).

Thailand and Malaysia are the only countries where agricultural land expansion has either slowed or reversed. Overall between 1990 and 2011 Thailand's agricultural land cover slightly contracted – although it seems to have been expanding again from 2000 – whereas Malaysia's agricultural land expansion seems to have stabilised since 2000. Although these trends have not directly resulted in increases in forest cover, they bode well for forest preservation as they show a reversal of the agricultural frontier and a possible decoupling between economic development and deforestation.

Sustained economic growth in Southeast Asia has been driven by substantial infrastructure investment,⁶ but this has also had consequences for forests:

- Road developments have connected many isolated communities to major markets but have also eased access to forests for loggers, farmers, agribusinesses and developers. Those forests that have remained intact or almost undisturbed are often in mountainous areas or steep slopes, where their exploitation and conversion is either impossible or too costly. Road development appears to have a detrimental impact on forests across continental Southeast Asia – especially in Lao PDR and northeast Cambodia (Stibig et al., 2007).
- Dams also threaten forests, especially in upper watershed areas. This is of economic and ecological significance given that forests help to control soil erosion, maintain water quality and conserve biodiversity. Dams are an especially significant threat to forests in the Upper Mekong tributaries of Lao PDR, given the large but unexploited hydropower potential of this area.

Population growth is also putting increasing pressure on forests. Empirical evidence for developing countries suggests that rural population growth correlates with agricultural land expansion (Barbier, 2004). According to the United Nations Population Division, between 2010 and 2030 the population of Southeast Asia will increase by about 20% (equivalent to around 120 million people). However, some of the changes that Southeast Asian economies are undergoing, such as a shift away from subsistence farming towards industry and services, the emergence of an environmentally-conscious middle class and rapid urbanisation (see Chapter 4), might mitigate the pressure that a rising population is likely to exert on forest resources.

Community-based forest management can help ameliorate complex forest tenure issues

In Southeast Asia, forest tenure types and forest property rights vary greatly. For instance, in Malaysia forests are generally owned by the state; property rights have been clearly defined and enforced as sustainable forest management has been institutionalised since as early as 1901. On the other hand, the Philippines suffers from a lack of precisely defined forest property rights, which is driving deforestation and forest degradation. However, the optimal type of tenure and ownership of forest resources and forest land in a country cannot be determined a priori as it depends on historical precedents and the types and uses of forests.

Devolving responsibility for forest management to local communities is now widely regarded as good practice in sustainable forest management. In principle, empowering

communities enables forest policies to be better tailored to specific local needs. If locally shared property rights are monitored and properly enforced, communities have a lesser incentive to free ride and overuse forest resources (e.g. Hardin, 1968; Ostrom, 1990). In the past, the replacement of traditional common property rights and community resource management systems with centrally designed institutions may have abetted open access exploitation of forests because of weak enforcement and poor involvement by the local population (Rola and Coxhead, 2005; FAO, 2006). For instance, in Suharto-era Indonesia, the government's claims to forests covering about three-quarters of the country superseded the rights of local communities to forests, but did not stop deforestation and forest degradation (Chomitz, 2007).

Community-based forest management (CBFM) has been adopted by Southeast Asian countries in the last two decades.⁷ However, effective implementation of CBFM has been slow, uncoordinated and hindered by a variety of governance challenges, including local lack of capacity and corruption and weak legal frameworks for enforcement (Poffenberger, 2006; Dahal and Adhikar, 2008; Asia Forest Network, 2014). And where laws sanctioning the creation of CBFM have generally only transferred limited forest resource stewardship rights to local people and national government continues to exert authoritative power over local decision-makers, the incentives for local people to manage forests sustainably are reduced (Pulhin and Dressler, 2009; Poffenberger, 2006).

The Philippines has the largest proportion of its state forest domain under CBFM. The country launched a CBFM programme in 1995, after a decade of experimentation with CBFM-style projects and schemes.⁸ According to FAO data, by 2005 communities held the management rights of about 47% of public forests. However, CBFM has not sufficiently empowered local stakeholders to bring about significant improvements to forest management (Pulhin and Dressler, 2009). Case studies indicate the main failings of CBFM in the Philippines to be the absence of monitoring and evaluation; the lack of recognition of property rights within tenured areas; insufficient budget; a lack of conflict resolution mechanisms; and absence of a current management plan (Castillo and Guiang, 2005). Such failings may apply more broadly, in other countries.

Overall, CBFM needs to be accompanied by central government support mechanisms, ranging from conflict resolution mechanisms and education and training to credit support for commercial production and marketing mechanisms. Such mechanisms should be designed in a way that involves the poorest members of the population and which minimises the risk of elite capture (Dahal and Adhikar, 2008).

More productive agricultural methods could protect forests and contribute to food security

Increasing agricultural productivity in ASEAN countries will also help to reduce pressure for forest conversion into agricultural land as long as forest protection laws are properly enforced. Yet some government policies may unintentionally contribute to deforestation by limiting growth in agricultural productivity. For instance, support for agricultural activities such as subsidies, tax breaks and cheap credits – often motivated by food self-sufficiency goals – inflate the profitability of agricultural activities and have been associated with increased deforestation rates (Pfaff et al., 2013). The focus on food self-sufficiency is misplaced, however, and the concept is often confused with food security. A recent OECD analysis of the agricultural sector in Indonesia, for instance, suggests that the various agricultural subsidies and import protection measures in place do indeed raise returns to farmers, but at the same time result in higher food prices while curtailing incentives for

increasing agricultural productivity (OECD, 2012). This type of policy therefore leads to higher deforestation rates without improving the access to food for poor consumers.

However, without the strong enforcement of forest protection laws, an increase in agricultural productivity will encourage the expansion of agricultural land by raising forest rents (e.g. Angelsen, 2010; Angelsen and Rudel, 2013). Higher agricultural productivity will make it profitable to expand agricultural areas to less fertile areas or by taking greater risks, such as clearing forests. To reduce deforestation and forest degradation, therefore, measures to increase agricultural productivity must be accompanied by the strong enforcement of forest protection laws.

Effective forestry laws and environmental governance are key

Improvements in the quality and the enforcement of forest laws and environmental governance are cornerstones of sustainable forest management. Case studies reveal that strong and equitable forest laws and environmental governance are key to building local communities' support for forest protection (Corbett, 2008). For example, Brazil's recent efforts to strictly enforce forestry laws appear to have slowed deforestation without hampering agricultural production (Box 3.2).

Box 3.2. Brazil's success in combatting deforestation through better monitoring and enforcement

The enforcement of forest conservation laws and defence of property rights are key elements in achieving sustainable forest management. Brazil's recent experience is encouraging. High resolution global maps of forest cover reveal that, of all the countries globally, Brazil has achieved the largest slowdown in annual forest losses, falling from a high of over 40 000 km² in 2004 to under 20 000 km² in 2011 (Hansen et al., 2013). This slowdown in deforestation is attributable to better monitoring and enforcement in fighting illegal logging, combined with incentive-based measures whereby landowners are paid for preserving forests (OECD, 2013a). Brazil's systematic use of Landsat (satellite) data in documenting deforestation trends has been crucial in policy implementation. To date, only Brazil produces and shares spatially explicit information on its annual forest extent and change (Hansen et al., 2013).

In the worst-affected states, local governments and civil society have pushed the federal state for more stringent anti-deforestation policies. They have taken action themselves by providing direct cash transfers to villages that conserved forests and by promoting the development of urban rather than rural areas (Boucher et al., 2013). A pledge of up to USD 1 billion from the Government of Norway to Brazil – conditional upon emission reductions from deforestation – has offered an important incentive for concrete environmental performance. Local governments and industries put in place new regulatory policies to establish and protect a network of indigenous lands and protected areas, assigning collective sustainable forest management rights to indigenous communities; this reduced their rate of emissions from deforestation about tenfold (Ricketts et al., 2010). In certain municipalities embargoes have been imposed on the soy and beef industries, among the main drivers of deforestation, with a credible threat of prosecution (Nolte et al., 2013).

In 2012, Brazil introduced a new forest code. Some of its parts have been criticised for unduly favouring commercial interests and being less protective than the previous 1965 law (OECD, 2013a). However, since the 1965 forest code was hardly enforced, the continuing efforts on the part of the authorities to improve enforcement may nevertheless increase the effective level of forest protection and slow down deforestation.

Payments for ecosystem services can protect forests and improve local livelihoods

Payments for ecosystem services (PES) schemes can help to both protect forests and reduce poverty. In such schemes the beneficiary of a specific, well-defined ecosystem service (such as final consumers benefitting from groundwater protection) pays the individual or community responsible for ensuring that the service is provided (Box 3.3).

Box 3.3. How do payments for ecosystem services work?

Payments for ecosystem services (PES) are voluntary payment mechanisms that aim to halt the depletion of natural resources and environmental degradation. PES rest on the premise that ecosystem services have a quantifiable economic value. In addition, this economic value must be such that there must be somebody who is willing to pay for these services (a buyer) and some others (a seller, i.e. individuals or community using the land where such services originate) willing to ensure the provision of this ecosystem service – for example by protecting forests – in return for the payment (OECD, 2010a; OECD, 2013b; Wunder, 2005). PES have been used for different purposes, such as carbon sequestration and watershed services and, to a lesser extent, for biodiversity and for the preservation of scenic beauty as a way to promote eco-tourism (Ingram et al., 2014).

Worldwide, PES have already mobilised fairly large quantities of finance for forest and biodiversity, with more than 300 PES schemes already implemented. For example, five large national PES programmes are estimated to channel over USD 6.5 billion annually (OECD, 2010a). PES can potentially be more efficient than regulatory approaches, and can complement environmental fiscal reforms that apply the polluter-pays principle (OECD, 2013b). In developing countries, a number of PES programmes have been successful in terms of ecological benefits and improved rural livelihoods (Ingram et al., 2014; OECD, 2010a; Wunder et al., 2008). However, scaling up benefits from PES programmes has been difficult as the majority of finance mobilised for PES comes from government or other third party financed programmes (e.g. REDD+, see Box 3.4). The literature has identified the following ingredients for success (OECD, 2010a; Ingram et al., 2014; Sandker et al., 2012; Pattanayak et al. 2010):

- The primary focus is on ecosystem service enhancement, with not too many competing objectives complicating the design of the programme.
- Payments are conditional on performance and compliance, and buyers and sellers have equal access to information.
- The payments are privately-financed instead of government-financed, which helps to make them more targeted and efficient.
- The programme includes significant support to participating local communities so as to build their bargaining skills, land/resource management, monitoring and enforcement.
- The programme directly benefits the rural poor.
- Negotiations are conducted transparently, through a trusted mediator, and with broad participation by the affected communities.
- All governance mechanisms are locally developed and transparent.

To date the Reduction in Emissions from Deforestation and forest Degradation (REDD and REDD+) is the most prominent PES programme worldwide (Box 3.4). It is based on the global ecosystem services which forest provide in the form of carbon sequestration. However, implementation of REDD mechanisms has stagnated because institutional investments have not been forthcoming, and local scientific capacity to monitor and use global observational records is lacking, among other operational obstacles (Hansen et al., 2013).

Box 3.4. Supporting countries in implementing REDD+

The United Nations REDD programme was launched in 2010 at the 16th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC). The premise was that reducing carbon emissions from deforestation and forest degradation in developing countries would cost less than reducing them in developed countries. Greenhouse gas emissions from the forestry sector are estimated to be 8.4 gigatonnes of CO₂ equivalent a year, or about 17% of global emissions (Sathaye et al. 2011), most of which are from developing countries located in the tropical zone (Harris et al. 2012). The REDD programme involves a system of voluntary international payments for verified CO₂ emission reductions in forest emissions.

Since then, REDD has evolved to include a broader range of conservation activities, as well as support for sustainable forest management and enhancement of forest carbon stocks. Now known as REDD+, financing for REDD+ has been channelled through voluntary international payment mechanisms, notably bilateral and multilateral agreements and carbon markets (Lubowski and Rose, 2013; Kerr, 2013).

However, delays in the development of global forest carbon and climate change mitigation agreements, as well as the lack of country systems and country readiness to receive finance, have posed barriers to implementing REDD+. The Forest Carbon Partnership Facility is providing countries with financial and technical assistance for building their capacity to implement REDD+ in Cambodia, Indonesia, Lao PDR, Thailand and Viet Nam. For instance, Indonesia's 2014 *Mid-Term Progress Report* identified the main problems in implementing REDD+ to be setting up national institutions; implementing the complex technical aspects of REDD+ (such as measurement, reporting and verification systems and reference emissions levels); strengthening governance; and improving consistency and co-ordination amongst the Climate Change Action Plans and the REDD+ Strategy and Action Plans at the national and sub-national levels.

To expand the scope of accounting for emissions due to land use changes in developing countries, the World Agroforestry Centre (ICRAF) has developed a methodology for “Reduced Emissions from All Land Use” in developing countries, and is currently exploring the feasibility of this landscape approach in Indonesia and Viet Nam (Bernard et al., 2013). The REALU approach could provide a stepping stone between REDD+ and comprehensive land sector accounting after 2020.

National REDD programmes are being established in Cambodia, Indonesia, the Philippines and Viet Nam (Table 3.2). For instance, in Viet Nam the REDD+ programme forms a major pillar of the country's efforts to meet its 2020 mitigation target of reducing greenhouse gas emissions by 20% by reducing emissions from the agriculture and rural development sector. Activities under the programme include estimating the baseline carbon stock, and establishing a monitoring system and benefit sharing.

Southeast Asian countries have also implemented some local PES programmes with some success. Viet Nam has the largest and most well-established programme in the region, and PES are specifically covered by law (WWF, 2014). A national trust fund, managed by the Forest Ministry, channels payments for ecosystem services in watershed areas.⁹ The fund receives its finance from a small additional charge included in residential water tariffs, from hydropower companies and the tourism sector, as well as from Norway and the World Bank through the national REDD+ programme. Every year since the programme began, USD 60 million has been channelled to the fund. At an earlier stage, payments were distributed to nearly 8 000 households (via 18 contracts with forest users), covering 202 000 ha of forest (Nguyen, 2011).

Table 3.2. The status of UN-REDD+ programmes in Southeast Asia

Country	UN-REDD national programme
Brunei Darussalam	No
Cambodia	Yes (2011-2013)
Indonesia	Yes (2009-2012 phase one)
Lao PDR	Partner country since 2012
Malaysia	Partner country since 2012
Myanmar	Partner country since 2011
Philippines	Yes (2011 – 2013)
Singapore	No
Thailand	No
Viet Nam	Yes (2009 – 2012 phase one)

Note: The status of partner country indicates that the country receives assistance to prepare to implement REDD+ without yet having a national UN-REDD programme.

Source: UN-REDD, www.un-redd.org, accessed August 2014.

In Indonesia, sub-national authorities have been piloting PES to improve watershed management (Vermeulen, 2007). Cambodia uses them to protect biodiversity (Clements et al., 2010; OECD, 2010a). A national biodiversity conservation fund in Malaysia was announced by the Prime Minister in 2013 and is to be approved by parliament in June 2014. The UNDP-supported fund will initially comprise USD 10 million from the national budget, with the aim of drawing international attention to Malaysia's efforts to protect biodiversity, as well as to attract co-financing from development co-operation agencies.¹⁰

Box 3.5. Assessing the value of forest ecosystem services in Leuser National Park, Indonesia

The Leuser ecosystem in Northern Sumatra (Indonesia) covers 25 000 km² and consists of the Leuser National Park – covering nearly 8 000 km² – and a buffer zone. The area provides a wide range of ecosystem services and is one of the two remaining habitats for Sumatran orangutans, in addition to being the natural habitat of rhinoceros, tigers and elephants. The entire ecosystem is under threat from deforestation and illegal poaching. Faced with the rapid degradation of Leuser National Park, authorities commissioned a study to evaluate and compare the impact of different park management strategies on the whole province.

The study concluded that conservation and selective use of the forests would provide the highest return for the whole region over the long term. The alternative – continuing deforestation – would generate a lower overall economic return for the province as a result of continuing degradation of ecosystem services.

The study also revealed the inequitable sharing of the benefits and costs of deforestation. Local communities would bear most of the costs of deforestation – around USD 2 billion over a period of 30 years. This would be equivalent to 41% of the benefits they would receive from ecosystem services if the forests were conserved.

Source: van Beukering et al. (2003).

Overall, the lessons learned from these initiatives include the need to develop a clear national-level mandate, institutional guidelines and a clear legal basis for such systems. Assessing the value of forests' ecosystem services is the first step in establishing PES for forests. Payments need be based on the economic value of the ecosystem services to be protected. When the true value of ecosystem services is properly taken into account, the cost of acting to sustain biodiversity and ecosystem services can be significantly lower than the cost of inaction (Box 3.5).

Southeast Asian countries are taking steps to evaluate their forests' ecosystem services fully. For instance, the Economic Planning Unit of the Prime Minister's office in Malaysia is currently undertaking a national study to evaluate and consolidate the value of the ecosystem services provided by wetlands. This is a good step towards sustainable forest management as such studies enable authorities and the entire population to understand the value of forests and the full costs of deforestation and eventually contribute to the establishment of PES.

Regional and international co-operation can contribute to sustainable forest management

Various forms of international co-operation can contribute to sustainable forest management in the region. For example, ASEAN countries could harmonise their forest definitions and establish a regional monitoring system to track forest cover and carbon stocks. International assistance could play an important role by making development co-operation to the forestry sector conditional on improving forestry inventory and monitoring programmes and by supporting such programmes directly. Viet Nam is using a combination of high resolution satellite images and field surveys to produce highly detailed forest maps. These could have many uses, including for PES schemes, UN-REDD+ and biodiversity compensation policies. All the collected data are expected to be managed by the National Forest Information System, established with the co-operation of Finland, which committed about EUR 14 million between 2009 and 2016 (Pham, 2012). Southeast Asian countries are generally making progress on monitoring forests, especially under UN-REDD+ programme initiatives, and would be well-advised to continue these efforts.

More ambitiously, regional action could prevent timber extraction from being diverted to those forest-abundant countries that are not participating in REDD schemes (Table 3.2) or other initiatives to reduce deforestation. For example, there is evidence that Viet Nam's large-scale reforestation programme, in progress since 1992, has diverted deforestation to other countries in the region, equivalent to about 39% of the regrowth of Viet Nam's forests between 1987 and 2006 (Meyfroidt and Lambin, 2009).

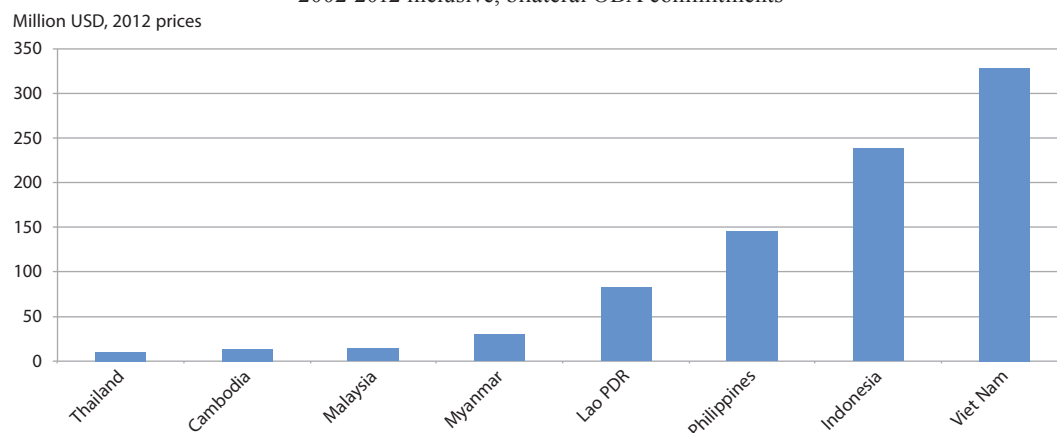
Development co-operation providers can also help to sustain local and global forest ecosystem services by targeting official development assistance (ODA) to the forestry sector. As we saw in Chapter 1 (Box 1.2), official development co-operation activities targeting environmental objectives are tracked and measured by the OECD's Creditor Reporting System (CRS) (Figure 3.9). According to these figures, between 2002 and 2012 Viet Nam's forestry sector attracted more than USD 300 million (in 2012 prices) of bilateral ODA. Indonesia and the Philippines also attracted a substantial amount of funds.


International forest certification (such as the Forest Stewardship Council – FSC certification), standards for timber and bilateral agreements (such as the EU's Bilateral Forest Law Enforcement, Governance and Trade – FLEGT – agreement) can all also help to combat illegal logging and promote sustainable forest management (Damette and Delacote, 2011). The FSC's labelling scheme enables the private sector to play a role in forest conservation by

raising awareness among consumers worldwide of the need to buy sustainably-sourced timber. It helps to increase the competitiveness of timber that has been produced in compliance with local forest laws, tenure and user rights; that respects the rights of indigenous people; and that is harvested in a way that conserves biodiversity and forest ecosystem services. The FLEGT agreement has been set up between the EU and Indonesia, while agreements with Lao PDR, Malaysia, Viet Nam and Thailand are under negotiation. Demand for certified timber exports can improve environmental standards in Southeast Asia (Vogel, 1997a and 1997b), but vigilance is needed to prevent them from becoming a non-tariff barrier to trade or from limiting the competitiveness of the timber sector.

Figure 3.9. **Bilateral development co-operation targeting the forestry sector varies across ASEAN countries**

2002-2012 inclusive, bilateral ODA commitments



StatLink  <http://dx.doi.org/10.1787/888933167941>

Source: OECD Development Assistance Committee Creditor Reporting System data, <http://stats.oecd.org/index.aspx?DataSetCode=CRSI>, accessed August 2014.

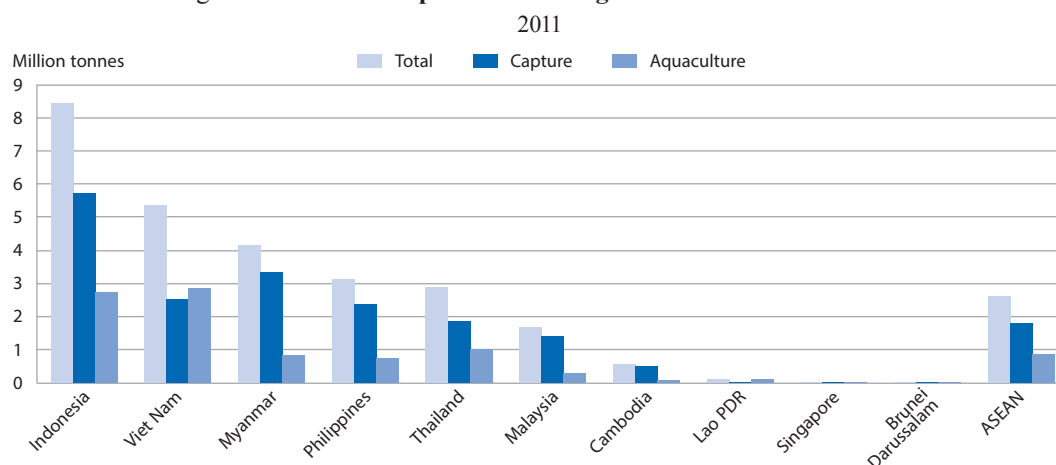
To conclude, moving towards more sustainable forest management in Southeast Asia will require a host of initiatives hinged on an ecosystem approach. Specific policies (discussed above) include clearly identifying the causes of deforestation and forest degradation (which are diverse across countries) and acting decisively by:

- improving the definition of property rights and the enforcement of land tenure
- supporting effective community-based forest management systems so as to actively involve the local population in the sustainable management of forests
- strengthening the monitoring and enforcement of forestry laws
- regularly collecting region-wide and consistent data on forest cover and quality to track trends and support regional co-operation
- increasing agricultural productivity, in conjunction with stronger enforcement of forest protection laws, so as to slow or reverse agricultural land expansion
- scaling-up payment for ecosystem services using international and local financing sources
- building regional and international co-operation on forest management issues and attracting ODA targeted to the forestry sector.

3.3. Sustainable fisheries support livelihoods, food security and biodiversity

Fisheries are an important source of production, trade and employment in coastal ASEAN countries, contributing more than 10% of Cambodia's GDP and between 2% and 5% in the other countries (Figure 3.10). The region as a whole is a net exporter of fish and fisheries products, with Cambodia, Indonesia, Myanmar, Philippines, Thailand and Viet Nam being net exporters and Brunei Darussalam, Singapore, Malaysia and landlocked Laos being net importers. In coastal areas, fisheries play a vital role in the subsistence of local communities by providing employment, income and nutrition. Across ASEAN, 20% of the population is directly dependent on marine resources for livelihoods and fish are a major source of protein (Suuronen et al., 2013).

Figure 3.10. Fisheries production is significant in Southeast Asia



StatLink <http://dx.doi.org/10.1787/888933167954>

Source: Author's calculations based on FAO Global Capture Production and Aquaculture Production Statistics, www.fao.org/fishery/topic/16140/en, accessed January 2014.

The Southeast Asian and Pacific region is home to the largest share of marine biodiversity in the world (Roberts et al. 2002). The Coral Triangle, located in parts of Indonesia, Malaysia and the Philippines (in addition to Papua New Guinea, Solomon Islands, and Timor-Leste), is home to 76% of the world's coral species, and is one of the most biologically diverse and economically productive marine regions (Suuronen et al. 2013).

Fish stocks and marine biodiversity are under threat

Most Southeast Asian countries have been experiencing diminishing fishing volumes. In the Gulf of Thailand, overfishing and the use of destructive fishing methods have led to decreasing catches despite improvements in fishing technologies and an increase in employment in the sector. Also, there is evidence that intense shrimp farming has led to the destruction of about 50-60% of mangroves along the coasts since 1975 (Barbier, 2007). Ill-defined property rights over mangrove areas along with the provision of subsidies for key inputs have contributed to unsustainable shrimp farming methods. In addition to overfishing, climate change imposes additional burdens on fisheries and the ecosystem services they provide. Changes in coastal climatic conditions directly affect marine biodiversity and ecosystems through the mortality, reproductive capacity and distribution of fish (OECD, 2011a). Viet Nam and Cambodia are two of the most vulnerable countries in the world to climate impacts on fisheries (Allison et al., 2009).

As for forests, sustainable fishery management must ensure that exploitation does not exceed stock renewal over the long term and does not impair ecosystem services. Given the importance of fisheries in ASEAN economies and their rich biodiversity, economically and environmentally sustainable fisheries are essential for the sustainable livelihoods of people in coastal areas as well as for national food security.

Both small and large-scale fisheries need to be regulated

There are significant economic and social gains to be reaped from sustainably managed fisheries. According to one study, rebuilding fisheries from a collapsed state would result in a two to five-fold increase in their value (Costello et al., 2012). However, these results are highly dependent on the ecological, economic and regulatory characteristics of the specific fishery industry. To inform sustainable fishing policies and actions aiming at rebuilding fish stocks, Southeast Asian countries with marine resources could tailor the research methods to their context.

Sustainable fishing policies aim to maintain fish stocks and preserve biodiversity. However, these policies are also likely to impinge on other socio-economic objectives, such as ensuring food security, and the livelihood of people in coastal areas relying on small-scale fishing. Meeting these socio-economic objectives will require effective complementary social protection and education systems as well as infrastructure networks that support alternative sources of income.

In designing sustainable fishing policies that are also socially inclusive, the political economy of fisheries needs to be understood. As in many other regions, the competition between self-employed, small-scale fishers on the one hand, and large domestic and foreign commercial fleets on the other, is a major complicating issue for developing sustainable fisheries management practices. Large-scale fishing operations with concentrated interests have in general greater bargaining power and muster greater political support than smaller-scale, self-employed fishers, notably for fishing subsidies and quotas. However, although small-scale fishing operations are worth protecting given their importance for the livelihood of coastal peoples, they too need to adopt more sustainable fishing practices. Small-scale fishers tend to be more difficult to monitor and regulate than large commercial operations, and in the absence of adequate incentives they may also engage in unsustainable fishing. For instance, in Indonesia small-scale fishers account for a large proportion of all fishing activities, but they do not require fishing permits and therefore remain largely unregulated (Varkey et al., 2010).

Sustainability requires clearly defined property rights and effective monitoring and control

Fisheries suffer from similar problems as forests. Poorly defined property rights over fishery resources and weak enforcement of existing laws lead to open access exploitation (Hardin, 1968; Ostrom, 1990). When secure property rights are lacking, the individual “race for fish” will eventually result in the ecological and economic collapse of fisheries.

Well-defined and enforced property rights are key to ending open access exploitation. In fisheries, regulating catch using incentive-based approaches based on well-defined property rights and quotas (known as catch shares) has the double benefit of providing long-term financial benefits to fishing communities and a more sustainable resource use (Costello et al., 2012). These rights can be granted to individuals (as tradable harvest quotas) or co-operatives, or can be allocated over spatial areas. Providing fishers with a secure asset encourages stewardship of the resource.

Catch shares work by granting fishers catching rights over a predetermined and sustainable quantity of fish, thus generating powerful incentives to improve efficiency and reduce costs instead of increasing quantity. In this respect, catch shares work similarly to price-cap regulation in the infrastructure sector or binding cap-and-trade system for controlling air pollution as they mimic market pressures leading to efficiency improvements.¹¹ One review of more than 10 000 fisheries worldwide found that catch shares prevent, and in some case reverse, fishery collapse (Costello et al., 2010).

The implementation of catch shares requires an effective monitoring, control and surveillance system. This is necessary to exert control over fishing efforts and reduce illegal, unreported and unregulated fishing. While such systems are a crucial aspect of sustainable and ecologically responsible fishery management, there is evidence that monitoring, control and surveillance systems need improvement in Southeast Asia. A recent study assess compliance by the 53 top-fishing countries with the articles of the FAO (UN) Code of Conduct for Responsible Fisheries against illegal, unreported and unregulated fishing (Pitcher et al., 2008). The biggest ASEAN fishing countries – Indonesia, Malaysia, Myanmar, the Philippines, Thailand and Viet Nam – all “failed”. Of these countries, Malaysia scored highest, and was midway in the global ranking, while the others were among the worst performers globally (Pitcher et al., 2008). Countries’ estimated volumes of illegal fishing are strongly correlated with the World Bank Governance Index, suggesting that countries with poor governance have less capacity to control illegal fishing (Agnew et al., 2009; Pitcher et al., 2008). This picture is consistent with more detailed country specific studies. For instance, in Indonesia the high prevalence of illegal, unreported and unregulated fishing is attributable to Indonesia’s inefficient fisheries’ data collection systems on account of the dearth of financial and human capacity necessary to monitor and maintain accurate records (Varkey et al., 2010).

Implementation and enforcement problems also exist even when the Code of Conduct for Responsible Fisheries has been adopted. For instance, although Thailand and Viet Nam have endorsed the code and integrated it into fisheries policy letters and legal frameworks, they are still struggling to combat illegal, unreported and unregulated fishing. This is because the design and implementation of on-the-ground measures remain weak due to administrative inertia, lack of political will and short-sighted economic considerations (Hosch et al., 2011).

Community-based fisheries management can improve marine conservation and local livelihoods

Over the last three decades, Southeast Asian countries have increasingly implemented community-based fisheries management (CBFM) in the attempt to reduce overfishing and conflicts over marine resources. This represents a change from the dominant trend in fishery management from the 1950s to 1990s, which saw Southeast Asian countries strengthening the role of national governments in the management of fisheries. Overall, this latter approach did not generate the expected results, as national governments proved incapable of replacing traditional, informal and decentralised local management systems (Pomeroy, 1995; McManus, 1997).

CBFM allows for a more participatory approach by empowering coastal communities with the principal responsibility for managing local resources. CBFM emphasises co-ordination among fishers over planning, monitoring and managing fisheries resources. CBFM may successfully overcome collective action problems as it allocates user rights to the custodians of the conservation area, therefore creating a direct link between

profitability and conservation efforts. CBFM is applicable to both large and smaller more artisanal fisheries.

Japan has a long history of CBFM or fishery community associations and their effectiveness in managing the fish stocks sustainably has been widely reported. Local fishers assume a large portion of responsibility for management and are largely responsible for devising regulations and monitoring compliance. Government agencies provide scientific information and legal support (Uchida, 2009). The necessary conditions for successful CBFM – clearly defined fishing-area boundaries, effective exclusion methods, and members being better off by being part of the CBFM – are not limited to Japan, but are also possible in other contexts. Japanese agencies have been involved in promoting CBFM across Southeast Asia. For instance, the Japanese Trust Fund and the Japanese Grassroots Tsunami Relief Fund, along with the Fisheries Consultative Group, have provided funds for the establishment of Locally Based Coastal Resource Management in Langkawi (in Malaysia) by the Southeast Asian Fisheries Development Centre and Malaysia's Department of Fisheries.

The Philippines has the longest history of CBFM (the first scheme was established in 1984), in which governments and fishers often co-operate as equal partners. In Thailand, Indonesia and Viet Nam the first CBFM systems were established in 1990s. In these countries CBFM take a more consultative approach, whereby the government consults with fishers, but still makes the important decisions (Pomeroy et al., 2007). Malaysia has encouraged the development of CBFM rather slowly, perhaps as a result of its centralised administrative system, and it has not always provided adequate support to local communities. In Cambodia, CBFM is still in its infancy – as it started in the early 2000s; as in Viet Nam it suffers from low levels of education and resources, which undermine the capacity of local communities to fully participate in the process. This is exacerbated by a vague legal framework for CBFM (Nasuchon and Charles, 2010).

Case studies of the Philippines show that well-defined and secure fisher rights result in a lasting shift in behaviour and attitudes towards resource conservation. Other important factors contributing to the success of CBFM are the early and continuing involvement of local communities and active support by the government in the form of sound legislation enshrining user rights, funding, training and enforcement (Pomeroy et al., 1996). Statistical evidence from fisheries in Indonesia, the Philippines, Thailand and Viet Nam shows that CBFM reduces the probability of conflicts over marine resources (Pomeroy et al., 2007). In Malaysia, the experience with locally based coastal resource management in Langkawi is positive, especially in promoting the active participation of community members in the management and conservation of marine resources and in the enforcement of rules and regulations (Saleh, 2008).

Overall, there is growing recognition in the region of the importance of involving local communities for the sustainable management of fisheries. For instance, the ASEAN-SEAFDEC (i.e. Southeast Asian Fisheries Development Centre) *Resolution on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020* aims to delegate certain fisheries' management functions to the local level, implement the effective management of fisheries through an ecosystem approach, and promote co-management between government and relevant stakeholders. These broad principles will need to be implemented through national legislation, however.

Marine protected areas need to protect biodiversity and provide local socioeconomic benefits

Well-planned marine protected areas can be effective instruments to conserve fish stocks and protect marine biodiversity. But they have often created social and economic

burdens on local populations by affecting their traditional source of livelihood (Christie, 2004). As there are strong links between the biological and socio-economic success of marine protected areas, they should be planned and evaluated taking into account both biological and socio-economic factors.

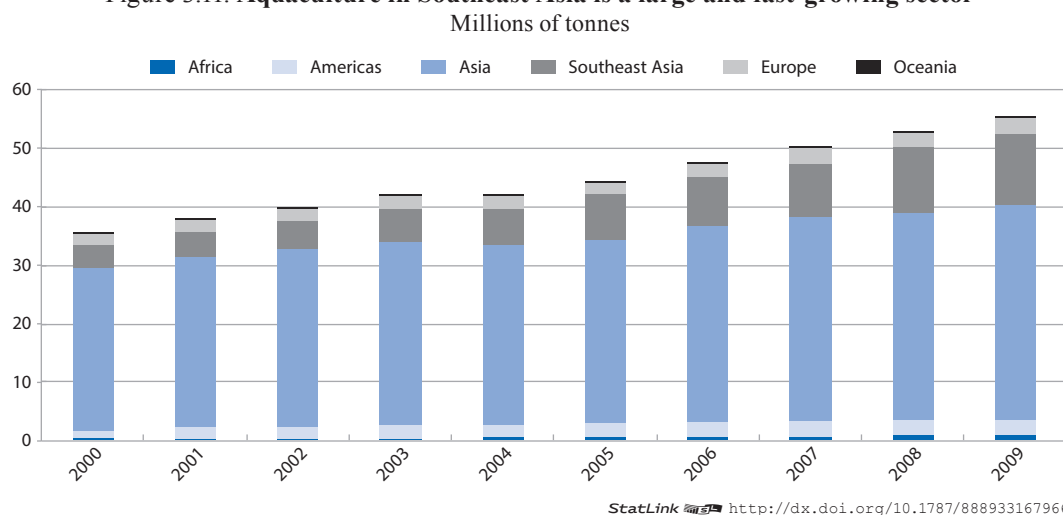
To be truly effective, marine protected areas should fit within broader national and international levels marine-protection management plans and be accompanied by an overall reduction in fishing effort. For instance there is evidence from the Philippines that despite robust enforcement of regulations, some marine protected areas did not prevent a decline in fish stocks and biodiversity because of their small size (Christie et al., 2002).

To better achieve social and environmental goals through marine protect areas, Cambodia and the Philippines have introduced community-based fisheries management in marine protected areas instead of applying strict bans on fishing. The basic premise of these initiatives is to make sure that the custodians of marine protected areas are also the main beneficiaries. In these programmes, small-scale fishers have been granted fishing rights conditional on protecting marine ecosystems (Hamilton, 2012). Other interventions compensate fishers for income losses – due to fishing bans – such as effective plans to develop eco-tourism (Wood et al., 2013; von Essen et al., 2013). The combination of marine protected areas with ecotourism or community-based management is important to create biologically and economically successful marine protected areas that generate stable and reliable financing sources.

Aquaculture industries and eco-labelling can be developed further

Southeast Asian countries are developing their aquaculture industries rapidly. From 2000 to 2009, the region's aquaculture production expanded by more than 230%, compared with 31% in the rest of Asia and 144% in the whole Africa. The share of Southeast Asia aquaculture production in the world total jumped from 10 to 22% over this period (Figure 3.11). In 2011 aquaculture accounted for 43% of Southeast Asia's total fishery production, up from 22% in 2000.

Figure 3.11. **Aquaculture in Southeast Asia is a large and fast-growing sector**



Note: Asia excludes Southeast Asian countries; Southeast Asia includes only the ten ASEAN countries

Source: Author's calculations based on Fisheries Statistical Bulletin of Southeast Asia, www.seafdec.org/downloads/fishery-statistical-bulletin-of-southeast-asia, various years.

Aquaculture can, in principle, contribute to protect fish stocks and increase the region's food security in the context of rising demand for fish products. However, although aquaculture helps protect marine biodiversity and fish stocks by reducing the need for wild captures, it also presents environmental risks. These include the release of large quantities of nitrogen and phosphorous and the dumping of feed not eaten by fish.¹² Moreover, unlike in developed countries, aquaculture in developing countries is mostly small-scale and extensive, and therefore more difficult to regulate. In Southeast Asia, Viet Nam and Thailand are exceptions as they have multinational aquaculture producers (OECD, 2010b).

National aquaculture plans could help develop Southeast Asian countries' aquaculture industries in a sustainable way. Countries could make progress by establishing and implementing – in the context of national plans – a regulatory framework that controls aquaculture's externalities while encouraging investment. The FAO Code of Conduct for Responsible Fisheries calls for states to “establish, maintain and develop appropriate legal and administrative frameworks which facilitate the development of responsible aquaculture”. Given the small scale of many aquaculture operations in Southeast Asia, authorities should continue to promote the development of co-operatives and clusters to enable knowledge sharing, marketing and easier access to finance.

Fisheries certification, such as eco-labels, can complement standards and good governance by reinforcing the effectiveness of market mechanisms to improve fisheries and aquaculture management. The use of certification is spreading in Southeast Asia. For instance, in 2013 Malaysia launched a promising aquaculture certification scheme as part of the broader Malaysia Good Agricultural Practices programme that consolidates various certification schemes. The main aim is to raise the quality of aquaculture products, reduce pollution from aquaculture and increase consumers' awareness and demand for quality and safe products through a recognisable product logo. However, the adoption of fisheries certification alone is unlikely to halt the decline of fish stocks in developing countries (Gulbrandsen, 2009). Given the capacity limitations of small-scale fisheries in developing countries to meet the standards associated with fishing certification, capacity building and support for monitoring should be provided.

International and regional collaboration is needed

Steps could be taken to promote region-wide agreements for the sustainable management of fisheries. Southeast Asian countries are already collaborating through the Southeast Asian Fisheries Development Center (SEAFDEC). Its members, who include the ten ASEAN countries plus Japan, have been co-operating on the sustainable management of the region's fisheries since 1967. Indonesia, Malaysia and the Philippines are already members of the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF), a multilateral partnership of six countries working together to sustain marine and coastal resources by addressing food security, climate change and marine biodiversity issues. The 10-year CTI Regional Plan of Action was adopted in 2009 to safeguard the region's marine and coastal biological resources. It aims to set up strong legislative, policy and regulatory frameworks for promoting an ecosystem approach to fisheries management.

For the effective management of the changing distribution of fish stocks in the face of climate change, data collection and the monitoring of marine species for ecosystem protection will be increasingly important. It is also increasingly important to develop markets for trading quotas internationally or at least at regional level and to establish, enforce and revise cross-country boundaries for marine protected areas. Southeast Asian countries should accelerate actions towards the creation and implementation of the ASEAN

Regional Fisheries Management Mechanism as envisaged within the ASEAN-SEAFDEC Strategic Partnership.

To conclude, policies for the sustainable management of fisheries should be based on an ecosystem approach. Specific initiatives (discussed above) include:

- promoting “rights-based” fishing in addition to the establishment and enforcing of fishing quotas as they provide powerful incentives to increase the productivity of fishing activities while preserving fish stocks
- supporting community-based fishery management practices: empowering local populations is key to changing attitudes and behaviours towards resource conservation
- establishing marine protected areas which take into consideration both their biological and socio-economic effects, and which are managed within broader marine-protection plans
- developing aquaculture further, but within the context of national aquaculture plans so as to mitigate the possible negative impacts on the environment and biodiversity
- fostering regional co-operation for fishery management, such as through the Southeast Asian Fisheries Development Centre and its partnership with the ASEAN
- aiming at sharing best practices to enhance fisheries’ institutional settings, collecting better data and reliable scientific information, and strengthening regional monitoring efforts to reduce illegal, unreported and unregulated fishing.

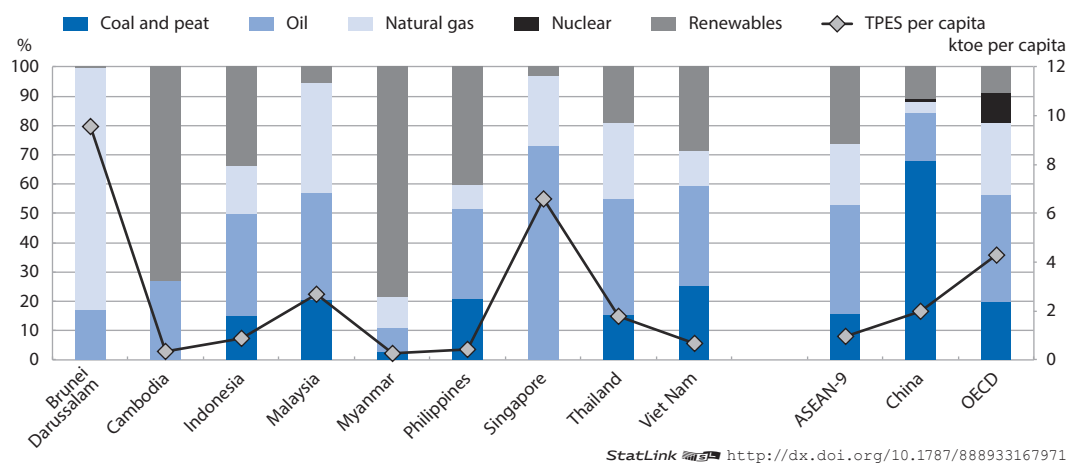
3.4. Green energy can sustain the region’s growth

Rapid economic development in the ASEAN region is being matched by fast-rising energy requirements, which are mainly being met through an increasing reliance on coal. As in OECD countries, and even more so in China, oil and coal are the primary energy sources in the ASEAN region (Figure 3.12; and see also Annex 3.A1) given that they are cheaper than the alternatives.

The current share of renewable energy sources in ASEAN countries is higher than in OECD countries and China – and about double the global average. However, this high share is mainly attributable to a lack of access to modern energy sources, especially in the rural areas in the region’s less-developed countries. Here traditional biomass (e.g. wood or cattle dung) is still important for domestic use (Figures 3.12 and 3.13).

In the richest Southeast Asia countries, e.g. Brunei Darussalam and Singapore, renewable energy sources play a small role. The largest share of the total primary energy supply (TPES) originates from a combination of oil, coal and natural gas. In Cambodia and Myanmar renewables are the most important energy sources, accounting for over 70% of TPES, largely due to reliance on traditional biomass (Figure 3.12). The renewable share is also significant in the Philippines (accounting for 40% of TPES) and in Indonesia (35%), partly because of traditional biomass use, but also because of the use of geothermal energy. Renewables play a slightly less important in Viet Nam and Thailand. In Viet Nam and Malaysia hydropower accounts for 15% of all renewable energy (Figure 3.13). Overall, wind and solar photovoltaics (PV) remain small in terms of overall generation in Southeast Asia, but their deployment is growing fast. Thailand and Malaysia, in particular, are rapidly installing solar PV capacity, driven by supportive government policies (IEA, 2013a).

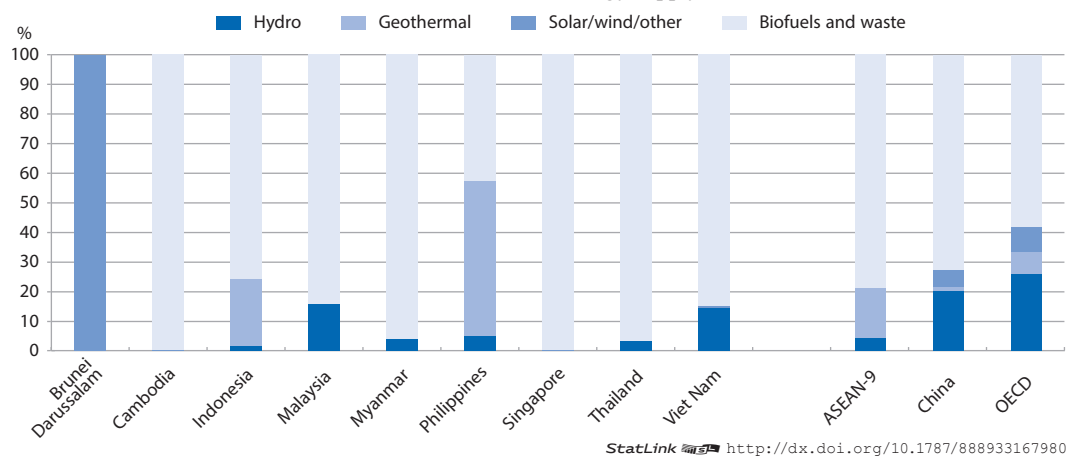
Figure 3.12. **Countries vary in their reliance on renewable energy**
Share of energy sources in total primary energy supply, 2011



Note: Share of total primary energy supply (TPES) excludes electricity trade. TPES *per capita* is expressed in thousand tonnes of oil equivalent (ktoe) per capita. ASEAN-9 is the arithmetic average of the countries appearing on the left side of the figure. ASEAN-9 is the arithmetic average of the countries appearing on the left side of the figure.

Source: Author's calculations based on IEA World Energy Statistics and Balances, www.oecd-ilibrary.org/energy/data/iea-world-energy-statistics-and-balances_enestats-data-en, accessed May 2014.

Figure 3.13. **Renewable energy sources vary across the region**
Share in total renewable energy supply, 2011



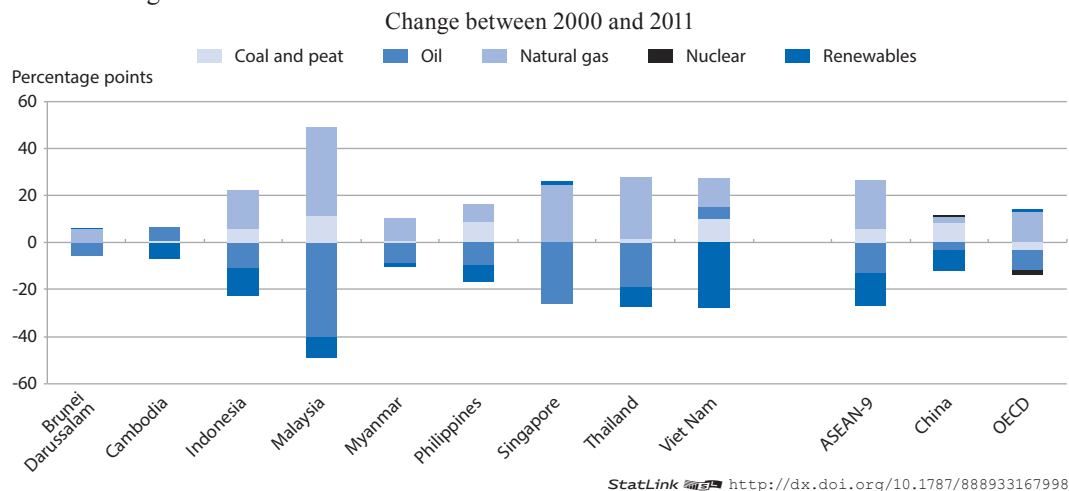
Note: ASEAN-9 is the arithmetic average of the countries appearing on the left side of the figure.

Source: Author's calculations based on IEA World Energy Statistics and Balances, www.oecd-ilibrary.org/energy/data/iea-world-energy-statistics-and-balances_enestats-data-en, accessed May 2014.

Although the average share of renewables across ASEAN countries is higher than in OECD countries and China, it declined between 2000 and 2011 while the share of coal and peat increased (Figure 3.14).¹³ Coal is the default choice for meeting the region's rising energy demand and energy security goals (IEA, 2013a). The decline in the share of renewables has been especially marked in Viet Nam (24 percentage points). Only Myanmar and Singapore have seen a rise in the share of renewables, owing to the importance of biofuels and waste for energy in both countries and, to a lesser extent, hydropower in Myanmar. In China, total primary energy supply also surged over the same period, while the share of renewables diminished by eight percentage points. At the same time China's primary energy supply sourced from coal and peat more than doubled, to account for more

than 75% of the increase in total primary energy supply. In OECD countries on the other hand, the total primary energy supply remained fairly stable over the period, but the energy mix shifted from oil towards renewables.

Figure 3.14. **The share of renewables has fallen in most ASEAN countries**



Note: ASEAN-9 is the arithmetic average of the countries appearing on the left side of the figure.

Source: Author's calculations based on IEA World Energy Statistics and Balances, www.oecd-ilibrary.org/energy/data/iea-world-energy-statistics-and-balances_enstats-data-en, accessed May 2014.

There is scope to produce more renewable energy

If social welfare gains arising from economic development are not to be undone or even reversed by environmental degradation, Southeast Asian countries will have to increase the share of renewables in their energy mix. The shift towards cleaner energy will also contribute to achieving the goal of “secure sustainable energy” as proposed by the UN High-Level Panel on the post-2015 agenda (OECD, 2014).

The ASEAN region's potential for renewable energy is high. Large untapped capacities remain, especially from hydro, geothermal and solar energy. Installed hydropower capacity is already the highest of all renewable sources, followed by biomass and geothermal (Table 3.3). Viet Nam has the highest overall installed renewable energy capacity, followed by Indonesia, the Philippines, Thailand and Myanmar. Although the Philippines and Indonesia have the world's second and third largest geothermal capacity (Table 3.3), geothermal still accounts for a small share of total energy supply. Wind and solar PV also remain small in terms of overall generation, although their deployment is growing fast. In Thailand, and Malaysia the installed solar PV capacity is increasing rapidly, thanks to supportive government policies. Singapore, a small but high-income country, is a champion of waste-to-energy technologies, while Indonesia and Thailand are leading the region's biofuel production.

The International Energy Agency's report *Southeast Asia Energy Outlook* (IEA, 2013a) forecasts that energy demand in the region will increase by more than 80% to 2035, which will require about USD 1.7 trillion of investment in energy supply infrastructure. Making sure an adequate share of this investment is devoted to increasing the share of renewables in the total energy mix will help to achieve a sustainable energy balance:

- Adopting newer and cleaner technologies will allow ASEAN countries to lock in the benefits from lower pollution levels for decades and leapfrog the pathway taken by more developed countries, which rely on older and more polluting technologies.


- Raising the share of renewables, along with improving energy efficiency, will reduce countries' vulnerability to fluctuations in fossil fuel energy prices, thus contributing to energy security.
- Energy generation from renewables can be more decentralised than fossil fuel power generation and can therefore help to increase energy access in a cost-effective way in rural and remote areas.¹⁴ For instance, Indonesia and the Philippines are implementing programmes to increase access to modern energy in rural areas by prioritising renewable energy sources such as geothermal, hydropower and biomass (IEA, 2013a).

Another study by the IEA (2010) suggests that there is large potential to raise the share of renewables in electricity, heating, and transport fuel over the medium term to 2030. The additional realisable potential in six ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam) could be about 12 times the current use of renewable for electricity generation.

Table 3.3. **Different countries focus on different types of renewable energy**

Total renewable energy installed capacity (megawatts)

Country	Hydropower	Biomass	Geothermal	Solar	Waste-to-energy	Wind	Total per country
Viet Nam	13 000	163		3		31	13 197
Indonesia	6 883	1 618	1 226	23		2	9 752
Philippines	3 556	262	1 967	5		33	5 823
Thailand	3 499	1 610	0.3	360	37	1	5 508
Myanmar	2 660						2 660
Laos	683			1			684
Singapore		251		5	257		513
Cambodia	207	7		2			215
Malaysia	16	52		45	9		122
Brunei Darussalam				1			1
Total per energy source	3 050	3 963	3 193	445	303	67	38 475

StatLink  <http://dx.doi.org/10.1787/888933168263>

Note: Data are for the latest available year between 2009 and 2012

Source: REN21 Renewables Interactive Map, www.ren21.net/REN21Activities/InteractiveMap.aspx, accessed March 2014.

Renewable energy technologies need clear policy support

The main obstacle to the growth of renewables in Southeast Asia is not resource availability, but a combination of price and non-price related barriers:

- Large fossil fuel subsidy programmes mean that consumer prices of fossil fuel-based energy are still lower than for renewables. In 2012, fossil fuel energy subsidies amounted to USD 51 billion in the region (IEA, 2013a), equivalent to about 11% of all general government spending.
- Non-price barriers to the deployment of renewables include underdeveloped energy infrastructure, making access to the grid complex, costly and uncertain; regulatory

and administrative hurdles; and policy uncertainty (IEA, 2010). By raising the risk profile of renewable projects, all these factors lead potential investors to demand higher rates of return, thus making renewable energy sources less competitive than fossil fuel alternatives.

- Renewable energy sources are often located far from their main markets; the lack of adequately developed transmission and distribution lines hinders their deployment in electricity generation.

The size of non-price obstacles to the deployment of renewables suggests that improving price signals alone – for example by removing fossil fuel subsidies and implementing a carbon tax (see Chapter 1) – will not be enough to rapidly increase the share of renewables in the energy mix. It will also be crucial to remove the other barriers and to create well-designed support policies for clean energy technologies, such as feed-in tariffs.

One step towards low-carbon energy infrastructure will be to implement technology-specific support measures. These allow less mature technologies to be tested and developed in more “protected” markets, while being supported by targeted R&D incentives, demonstration incentives, feed-in tariffs and other market-based mechanisms (see also Section 2.2 in Chapter 2). Feed-in tariffs can, for instance, speed up cost reduction of renewable energy technologies, accelerating cost competition with conventional energy technologies (Mendonça and Jacobs, 2009). Recent evidence from China’s wind power projects, financed through the Clean Development Mechanism, show that each additional project built in co-operation between the developer and the manufacturer lowers production unit costs by about 0.25% (Tang and Popp, 2014).

Feed-in tariffs are expanding rapidly across Southeast Asian countries and already represent one of the main incentive schemes for renewable energy technologies. Thailand was the first ASEAN country to introduce renewable electricity feed-in tariffs (in 2007), followed in the early 2010s by Indonesia, Malaysia, the Philippines and Viet Nam. Other renewable energy incentives include tax and import duty exemptions for certain renewable energy technologies (and their components) in Malaysia, the Philippines and Indonesia; capital costs grants in Thailand and Malaysia, and R&D incentives in Singapore.¹⁵ Other countries, like Myanmar, still need to develop a clear renewable energy regulatory regime and policy support framework.

The private sector has an important role in promoting renewable energy

Private sector participation will be paramount to meeting energy infrastructure investment needs and increasing the share of renewables. Given the competing demands for public resources from other important sectors, such as health care and education, public finance alone will not suffice to cover the infrastructure investment required to achieve a sustainable energy mix. However, several barriers are preventing private-sector investment in clean energy technologies, including large subsidies for fossil fuels (in some countries), uncertainties about their removal and policies to boost the market penetration of renewable energy sources, and difficulties in connecting them to the existing energy grids. OECD guidance identifies key issues for developed and developing countries to consider for increasing private sector involvement in clean energy infrastructure (Box 3.6).

Three principles should guide government action in the area of investment policy, promotion and facilitation: non-discrimination, investor protection and transparency. In the context of Southeast Asia, two issues need particular consideration: restrictions on foreign direct investment (FDI) and energy subsidies.

Box 3.6. OECD policy guidance for investment in clean energy infrastructure

The *OECD Policy Guidance for Investment in Clean Energy Infrastructure* (OECD, 2013c) is a non-prescriptive tool to help governments – especially of developing and emerging countries – to establish propitious conditions for raising clean energy infrastructure investment (Table 3.4). It builds on the *OECD Policy Framework for Investment* (OECD, 2006), which is the most exhaustive and multilaterally-backed instrument aiming at improving investment conditions. The policy guidance has also benefitted from substantial contributions from the World Bank and UNDP.

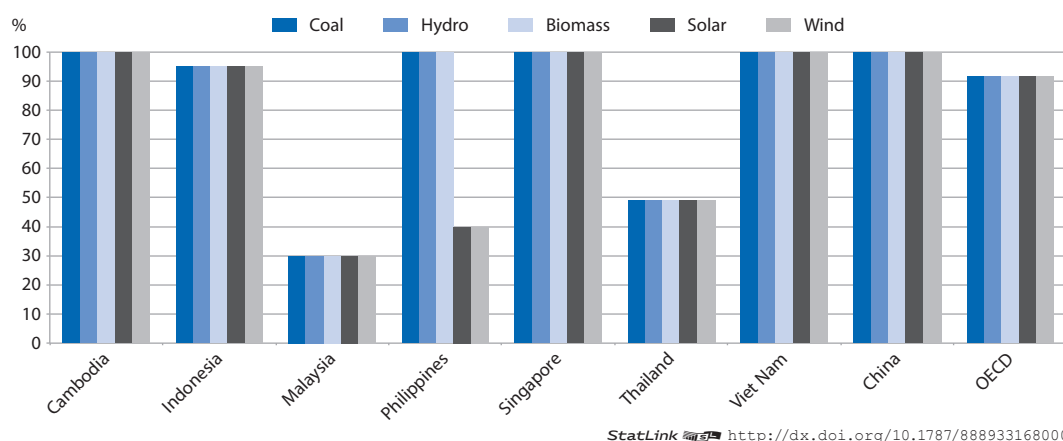
Policy areas covered in the *OECD Policy Guidance for Investment in Clean Energy Infrastructure*

Policy areas	Questions/issues for policy makers	Overall objective
1. Investment policy	<ul style="list-style-type: none"> • Non-discrimination of foreign versus domestic investors • Intellectual property rights • Contract enforcement 	The quality of investment policies directly influences the decisions of all investors, be they small or large, domestic or foreign. Transparency, property protection and non-discrimination are investment policy principles that underpin efforts to create a sound investment environment for all.
2. Investment promotion and facilitation	<ul style="list-style-type: none"> • Carbon pricing and removal of fossil-fuel subsidies • Long-term policy goals • Policy incentives for investment • Licensing • Policy coherence and co-ordination 	Investment promotion and facilitation measures, including incentives, can be effective instruments to attract investment provided they aim to correct for market failures and are developed in a way that can leverage the strong points of a country's investment environment.
3. Competition policy	<ul style="list-style-type: none"> • Electricity market structure • Non-discrimination in access to finance • Competition authority 	Competition policy favours innovation and contributes to conditions conducive to new investment. Sound competition policy also helps to transmit the wider benefits of investment to society.
4. Financial sector development	<ul style="list-style-type: none"> • Access to finance • Specific financial tools and instruments • Strengthened domestic financial markets 	Well-functioning financial markets can strongly contribute to enhancing investment opportunities for both domestic and foreign investors.
5. Public governance	<ul style="list-style-type: none"> • Regulatory quality of the electricity market • Multi-level governance 	Regulatory quality and public sector integrity are two dimensions of public governance that critically matter for the confidence and decisions of all investors and for reaping the development benefits of investment.
6. Cross-cutting issues	<ul style="list-style-type: none"> • Regional co-operation • Public-private partnerships (corporate governance) • Trade policy 	

Source: OECD (2013c).

FDI restrictions in the Southeast Asia energy sector may retard its development. The region's countries have shallow financial markets and a lack of long-term domestic institutional investors (Chapter 2). Lowering foreign equity restrictions in renewable-based electricity generation sectors, such as hydro, biomass, solar and wind, could accelerate the development of these sectors by attracting foreign capital. Malaysia and Thailand have the most restrictive foreign equity participation regime, limiting foreign participation to 30 and 49% of businesses' equity (Figure 3.15). The Philippines has similarly restrictive rules for wind and solar power electricity generation, but no restrictions in its coal and hydro-power sectors.

Figure 3.15. **Foreign equity restrictions in electricity generation**
Maximum share of foreign ownership allowed



Note: The same restrictions on foreign equity share apply to greenfield and brownfield investments. Brownfield investment is when a company or government entity purchases or leases existing production facilities to launch a new production activity. The alternative to this is a greenfield investment, where a new plant is constructed.

Source: Author's calculations based on World Bank Investing Across Borders – Indicators of Foreign Direct Investment Regulation, <http://iab.worldbank.org>, accessed May 2004.

Energy subsidies in the region are also heavily skewed towards fossil fuels. Besides being highly inefficient and promoting the consumption of polluting energy sources, fossil fuel energy subsidies blunt the effectiveness of clean energy-promoting policies such as feed-in tariffs, and increase uncertainty. For instance, in Indonesia the subsidy to the state-owned electricity production and distribution company (PLN) is determined annually. As a result, independent power producers selling electricity to PLN do not know in advance whether it will have the resources to pay for the electricity it purchases from them.

Removing fossil fuel subsidies and putting a price on carbon are key pre-conditions for encouraging private investments in clean energy instead of in fossil fuel energy infrastructure. In addition, fossil fuel subsidies deprive energy companies of the revenues that would be needed to finance new investment and, often, pay for ordinary maintenance. Eliminating fossil fuel subsidies could yield substantial budget savings, which could then be used to provide targeted income support to low-income families (see also Chapter 1).

A sound and transparent business environment that ensures a level playing field between public and private investors is another precondition for private participation in clean energy infrastructure. A number of ASEAN countries already allow private participation in the electricity sector, especially in electricity generation, and to a more limited extent in transmission and distribution, but incumbent state-owned enterprises are often granted

preferential treatment (Box 3.7). However, as the contrasting experiences of Lao PDR and Cambodia show, private participation needs be accompanied by clear long-term government strategies and well-regulated state-owned enterprises if they are to increase electrification rates and promote renewable energy sources in electricity generation.

Box 3.7. Private sector participation in the ASEAN electricity sector: a review

While the past 20 years have seen ASEAN countries reform their electricity sectors and allow some private participation, it is still limited.

In **Thailand**, despite the liberalisation reforms of the late 1990s and 2000s, the energy market is still uncompetitive and under monopoly control of state-owned enterprises because of weak competition and regulatory authorities (Wisuttisak, 2012). As a consequence, third party access to the existing infrastructure network is severely restricted, thus limiting private sector involvement.

In the **Philippines**, there is still very little competition in the wholesale electricity market despite an important reform passed in 2001 envisioning full privatisation covering unbundling generation, transmission, distribution, and retail services (Wu, 2013).

In **Indonesia**, the new legal system for the electricity sector adopted in 2010 allows for private participation in the generation, transmission, distribution and sale of electricity, but it also preserves preferential treatment for state-owned enterprises (Pisu, 2010). The new legal system also fails to establish a regulatory authority and leaves to the government the responsibility for determining and updating electricity tariffs for the retail market.

In **Malaysia**, the electricity generation sector has been partially liberalised by allowing private entry, but almost all power is purchased by the incumbent state-owned enterprises, which has monopoly power in purchase, transmission and distribution of electricity (Wu, 2013).

In **Viet Nam** the energy sector is undergoing important reforms; independent power providers only began generating electricity in 2004. The electricity law passed in 2004 aims at phasing in full power market liberalisation in generation, transmission and distribution by 2024 (Wu, 2013). The law has importantly established an electricity regulatory authority whose duties include: 1) issuing and enforcing electricity licences; 2) advising the government on market structure and policy; 3) proposing that the market design and develop the necessary regulatory framework; and 4) overseeing the operation of the electricity market (Lovells, 2009).

Lao PDR has a high electrification rate despite its low level of income. To date, more than 70% of households have access to electricity. This has been achieved thanks to the development over the last three decades of hydropower generation and grid extension by the national electricity utility (EDL), in combination with sound government policies for EDL's financing and electricity tariffs. Reforms which began in the 1980s have been instrumental in increasing private participation in the sector through the development of public-private partnerships. Public-private partnerships have also been playing a key role in extending off-grid electricity access to the rural population by means of solar home systems (World Bank, 2012).

Private participation in **Cambodia's** electricity sector is high, but the sector is highly fragmented. This has resulted in one of the lowest electrification rates in the region (only about 30% of household have access to electricity). Moreover, its *per capita* electricity power consumption is one of the lowest in Southeast Asia and its electricity tariffs are among the highest in the world. Cambodia lacks a national grid and as a result cities, towns and rural areas are served by scattered and isolated systems. The vertically integrated state power utility (Electricité du Cambodge, EDC) owns and operates only about 20% of the total installed capacity – which is primarily based on diesel – and supplies electricity to the capital and some other major towns. Local government enterprises, independent power producers or other

Box 3.7. Private sector participation in the ASEAN electricity sector: a review
(continued)

licensed private enterprises account for the remaining share of installed capacity. EDC is also the regulator for the sector and its responsibilities include issuing licenses to all operators in the sector, reviewing operators' costs and approving the tariff, resolving disputes and imposing penalties (World Bank, 2010; Poch and Tuy, 2012).

The energy sector in **Myanmar** is still underdeveloped and its electrification rate is among the lowest in Southeast Asia – broadly on a par with Cambodia. All power generation companies are state-owned, as are distribution and transmission lines. The government has not yet announced liberalisation reforms in the electricity sector, or for any other sectors of the economy. As a result, the entry of private firms in the electricity sector is still unclear. To date, power generation capacity is insufficient to meet demand, especially in the dry season as about 76% of installed capacity relies on hydropower. The result is regular power outages. Transmission and distribution lines are underdeveloped, especially outside the capital. The power sector is the responsibility of the Ministry of Electric Power and no regulatory authority for the electricity sector exists. Within the Ministry of Electric Power, the Myanmar Electric Power Enterprise is responsible for the development and implementation of the transmission network. Two distribution enterprises operate the distribution systems in the country, one responsible for Yangon City and the other for the rest of the country (ADB, 2014).

Brunei Darussalam has a vertical electricity sector with no private sector participation.

Land acquisition problems can significantly hinder the development of infrastructure, especially clean energy. Most renewable energy plants require more surface area per megawatt than those using fossil fuels (some high-quality geothermal and hydro-electric plants are the exception). As a result, building renewable energy plants often involves engaging with more than one landowner. Equally important, renewable energy power plants often need be located close to the natural resources they exploit, requiring engagement with the local populations who do not necessarily have formal property rights over the land they occupy. Countries where land acquisition is a particular problem need to improve the eminent domain legislation (i.e. expropriation of private properties for public use) so as to speed up the process of land acquisition and ensure fair compensation for rightful owners and local populations.

Land acquisition is generally acknowledged as one of the main hurdles to the development infrastructure in Indonesia (e.g. Pisu, 2010). Yet Indonesia has made progress by enacting a new law in 2012 that comprehensively regulates the eminent domain process. The new law ("Land Procurement for Development in the Public Interest" or the "Land Acquisition Act") sets out specific procedures and time limits for the expropriation of land in the public interest. Overall, the new law and its implementing regulations help to improve the legal certainty around the process of eminent domain and investors will be able to estimate more reliably the time and costs involved in completing the land acquisition process. However, the law applies to new projects only and is still untested.

Strengthening regional co-operation will promote renewable energy and increase energy security

Deepening intra-regional co-operation will be key to achieving sustainable management of energy sources in the ASEAN region. Energy co-operation is already a cornerstone of the ASEAN region. The first energy co-operation agreement among Southeast Asian countries (between Thailand and Lao PDR) was made one year before the first ASEAN declaration

was signed in 1967. In their move towards establishing the ASEAN Economic Zone by 2015, ASEAN countries are deepening national energy market integration and strengthening regional co-operation to develop renewable energy (Shi and Malik, 2013).

Shifting towards the sustainable management of energy in the region will require greater cross-border trade in electricity and increasing the share of renewables in the mix. According to the IEA (2013a) the power sector will account for more than 50% of the increment in primary energy demand in Southeast Asia to 2035. Among renewables, hydro has the greatest potential for power generation, especially in the Greater Mekong Subregion – Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam. Hydro-power is already the most developed renewable energy source in the region, but only about 20% of its potential has been exploited (IEA, 2010). There is also large unexploited potential for biomass feedstock, ranging from agriculture and forestry residues to forestry products.

Given the geographic concentration of hydro resources and other renewables, augmenting their share in the region's power generation will hinge on developing distribution and transmission lines further. Progress needs to be made to better connect supply centres with end users within and between countries. Currently, international grid connections already facilitate some electricity trade, especially in the Greater Mekong Subregion. For instance, Lao PDR is already a key net exporter of electricity generated by hydro-power plants to Thailand and China. Myanmar also has great potential for hydro-generated electricity, although it is also seeing large and rapidly-rising domestic demand.

The five-yearly ASEAN Plan of Action on Energy Cooperation (PAEC, first started in 1999) has set intermediate targets for the development of the ASEAN Power Grid (APG) and Trans ASEAN Gas Pipeline (TAGP). It also has targets for increasing renewable energy sources for power generation. In addition to sharing reserve margins (i.e. capacity over and above what is needed to meet normal peak demand levels) and increasing competition within and across borders, this will raise the use of renewables and it will allow countries to source electricity generated from renewable sources beyond their national borders. Some authors assert that a more open power trade regime in the ASEAN region will encourage the development of renewable resources and result in large cost savings in meeting the rising energy demand – savings estimated at around 3% and 4% of total costs based on a scenario in which 20 and 50% of total demand is met by international trade, respectively (Chang and Li, 2012).

Plans to expand hydroelectric power generation capacity, however, will have to recognise and deal effectively with international river management issues, especially in the Greater Mekong Subregion. Upstream hydroelectric dams could generate environmental challenges in downstream areas, such as reduced fish migration, lower silt deposits and irregular water discharges causing sudden floods. The Mekong River Commission (MRC) was established in 1995 by Cambodia, Lao PDR, Thailand and Viet Nam to promote regional dialogue on issues relating to the management of the Mekong River.¹⁶ To manage transboundary impacts effectively, the MRC works with member and partner countries on strategies and policies for the sustainable development of hydropower along the Mekong River. Its 1995 founding document mandates the use of Procedures for Notification, Prior Consultation and Agreement so that countries can be notified of mainstream hydropower development proposals and evaluate their potential risks and opportunities. This process is still evolving, however, as member countries for instance were not informed and did not reach consensus on the Xayaburi Dam project, which is currently under construction in northern Lao PDR (WWF, 2014). In addition, there is no forum for conflict resolution. Southeast Asian countries should strengthen this type of regional collaboration so as to increase policy coherence between green growth strategies and regional energy self-sufficiency objectives.

Progress towards a fully integrated ASEAN in general will critically depend on improving “soft” infrastructure, such as harmonising the regulatory framework, licensing requirements and third party access. To this end, the Joint Ministerial Statement of the 30th ASEAN Ministers of Energy Meeting (in 2012) underlined the importance of furthering collaboration among regulatory authorities through the establishment of the ASEAN Energy Regulators’ Network (AERN). However, the AERN is a purely consultative body as its mandate is limited to strengthening communication channels for promoting mutual understanding of energy regulations in member states and contributing to regional economic development. It differs from the EU’s Agency for the Cooperation of Energy Regulators in that the latter complements and co-ordinates the work of national energy regulators at EU level and works towards the completion of the single EU energy market. Although the Agency for the Cooperation of Energy Regulators usually issues non-binding opinions and recommendations to national energy regulators, transmission system operators and the EU institutions, it can also – in specific cases – take binding decisions concerning the terms and conditions for access to and operational security of cross-border infrastructure, as well as on third party access and unbundling exemptions.¹⁷

3.5. Extractive industries can become more sustainable and contribute to green growth

Southeast Asia’s mining industry is largely built on aluminium (concentrated in Indonesia), nickel (mainly Indonesia and the Philippines) and tin (more evenly spread among Indonesia, Malaysia and Thailand and, to a lesser extent, Myanmar and Viet Nam). Other important extractive industries in the region are copper, gold and zinc (Table 3.4).¹⁸ Even so, the region’s mineral extraction rate is significantly smaller than China’s. For example, in 2011 China’s aluminium production was 25 times higher than the ASEAN’s, steel was 35 times higher and iron was 150 times higher. One exception is nickel, of which China, Indonesia and the Philippines produce equal amounts.

In Southeast Asia rents (i.e. profits above the natural profit rate) from extractive industries are significant. On average between 2005 and 2012, mining rents amounted to more than 10% of GDP in Lao PDR and 2% in Indonesia and the Philippines (Table 3.5).¹⁹ Fossil fuel energy resources (oil, natural gas and coal), which are part of extractive industries and whose extraction poses similar environmental challenges to those of mining activities, are also large (see Annex 3.A1). Overall over the period, mining and fossil fuel energy resource rents amounted to more than 50% of GDP in Brunei Darussalam, 14% in Malaysia, 13% in Viet Nam 11% in Lao PDR (only mineral rents) and 10% in Indonesia. Comparable figures for China and India are lower, at about 7% and 5% respectively.


The sustainable exploitation of mineral resource requires: 1) a strict evaluation of the environmental risks mining activities entail; 2) a high degree of transparency to ensure non-renewable resources are exploited for the public good; 3) efficient forms of taxation, so the government can use revenues from extractive industries to build a broader base for sustainable economic growth.

These three elements – discussed in detail in this section – are consistent with green growth as they help to:

- internalise the social costs of extractive activities, such as deforestation, pollution and displacement of local people
- promote alternative sources of growth to replace mineral resources as they become exhausted.

Table 3.4. **Mineral production in the ASEAN region**
Thousands of metric tonnes if not otherwise stated, 2011


Country	Aluminium (alumina, bauxite and metal)	Copper (Mine output, Cu content and refined, primary)	Gold, kilograms (output, Au content)	Iron (ore, gross weight and pig iron)	Manganese (ore, mine output, Mn content)	Nickel (mine output and refinery products)	Tin, metric tonnes (mine output, Sn content and metal primary)	Zinc, metric tonnes (mine output, Zn content and metal)
Brunei Darussalam	0	0	0	0	0	0	0	0
Cambodia	0	0	0	0	0	0	0	0
Indonesia	40 244	800	96 100	0	42	238	85 000	0
Laos	0	218	3 984	0	0	0	750	4 320
Malaysia	188	0	4 215	7 699	225	0	43 613	0
Myanmar	0	20	100	2	234	0	11 030	7 000
Philippines	0	228	31 120	0	2	241	0	18 170
Singapore	0	0	0	0	0	0	0	0
Thailand	0	0	2 372	970	24	0	20 282	97 867
Viet Nam	100	19	3 500	4 968	28	0	8 400	38 000
ASEAN total	40 532	1 284	141 391	13 638	555	479	169 075	165 357
China	101 300	4 660	362 000	1 970 510	2 800	265	276 000	9 260 000
World total	400 300	32 500	2 670 000	4 070 000	15 800	4 320	575 000	25 200 000

StatLink  <http://dx.doi.org/10.1787/888933168272>

Source: BGR (2012), *Energierohstoffe 2012, Reserven, Ressourcen, Verfügbarkeit, Tabellen* (Energy resources 2012, reserves, resources, availability, tables), BGR, Hanover, Germany.

Table 3.5. **Rents from extractive industries are significant in Southeast Asia**
2005-2012 yearly average (% GDP)

	Minerals	Oil	Natural gas	Coal	Total
Brunei Darussalam	0.0	32.5	21.6	0.0	54.1
Cambodia	0.0	0.0	0.0	0.0	0.0
Indonesia	2.1	4.0	2.7	1.3	10.0
Lao PDR	10.7	.	.	0.3	11.0
Malaysia	0.2	7.3	6.1	0.0	13.6
Philippines	2.1	0.2	0.5	0.1	2.9
Singapore	0.0	0.0	0.0	0.0	0.0
Thailand	0.1	2.1	2.1	0.1	4.3
Viet Nam	0.5	8.7	1.9	1.6	12.7
China	2.1	2.0	0.3	2.2	6.6
India	1.7	1.3	0.6	1.4	4.9

StatLink  <http://dx.doi.org/10.1787/888933168286>

Note: Mineral rents are the difference between the value of production for a stock of minerals at world prices and their total costs of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate; oil rents are the difference between the value of crude oil production at world prices and total costs of production. Natural gas rents are the difference between the value of natural gas production at world prices and total costs of production. Coal rents are the difference between the value of both hard and soft coal production at world prices and their total costs of production. Data for Myanmar not available; for Lao PDR, oil, natural gas and coal rents data are not available.

Source: World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed September 2014.

The environmental impacts of extractive industries need to be dealt with

Extractive industries can be the cause of serious environmental and human health problems. Throughout its different stages (prospecting, exploration, mine development, exploitation and reclamation), extractive industries can have several impacts on the environment, ranging from deforestation and landscape changes to water and soil contamination (Voulvoulis et al., 2013). This compounds the impact of extractive industries on natural capital depletion, as in addition to exhausting the non-renewable resource being extracted, it also damages other aspects of the natural capital, possibly irreversibly.

Southeast Asian countries should systematically perform environmental impact assessments of extractive industries' activities. Environmental impact assessments can improve the planning, monitoring and management of extractive industries and reduce their pollution impacts. Such assessments should be based on a sound understanding of source-pathway-receptor linkages, which are specific to different extractive activities and the areas where they take place. Importantly, these assessments should also be an integral part of a wider plan for the sustainable management of natural capital (Voulvoulis et al., 2013). While there are environmental regulations governing extractive industries in the region, such as Malaysia's requirements for the reclamation and restoration of mine sites, the regulations and their implementation vary greatly across countries and are often opaque.

The ASEAN is aware of the potential environmental impact of extractive industries' activities. The 2007 ASEAN Declaration on Environmental Sustainability mentions the need to foster the sustainable management and efficient use of mineral resources and environmentally-sound mining practices.²⁰ ASEAN countries should forcefully incorporate these broad principles into national laws. In addition to setting out these principles, the ASEAN could play an important role in harmonising standards and regulations across the region, to avoid mining companies facing vastly different environmental requirements and obligations in each ASEAN country.

Increasing transparency in the extractive industries is long overdue

In resource-rich countries, transparent extractive industries can contribute to implementing green growth strategies. Transparency allows for clarity over the private and social costs and benefits of extractive activities – a precondition for devising effective green growth policies.

One way in which the region can increase its transparency would be to participate in the Extractive Industry Transparency Initiative (EITI). The EITI is a voluntary initiative launched in 2002 at the World Summit for Sustainable Development in Johannesburg. Its main aim is to ensure the transparency of payments from natural resources exploitation. According to EITI standards, extractive companies must fully disclose the taxes and other payments made to governments; governments must disclose what they receive from the same companies; and finally these figures are reconciled by an independent administrator. The EITI has defined the standards countries must adhere to be recognised as EITI Candidate and EITI Compliant countries (EITI, 2013). There is already some evidence that EITI has had a positive effect on the economic development of participating countries (Corrigan, 2014) although it is too early to assess its effect on green growth objectives.

To date, only Indonesia and the Philippines are EITI Candidate countries and none is an EITI Compliant country. Participation in the EITI by all ASEAN countries would have the benefit of helping to create a level-playing field for the extractive industries sector across the region. This would remove any incentive for mining companies to shift their operations to countries with a more opaque operating environment and lower regulatory-compliance costs.

Taxing extractive industries effectively can fund investment in other sectors

Given the large rents extractive industries generate in many Southeast Asian countries, taxing them could generate substantial revenue. Using this revenue to fund investment in other sectors of the economy could help put the region on a sustainable development path. This is consistent with the “weak sustainability” concept, in which activities that deplete natural capital are taxed and the receipts invested in alternative forms of capital (see Box 3.1).

Figure 3.16 shows the extent to which natural capital depletion has been accompanied by physical and human capital accumulation, the former through fixed capital investment and the latter through education spending. In Indonesia, following the financial crisis of the late 1990s, increasing natural capital depletion was accompanied by decreasing physical and human capital accumulation rates. Malaysia and the Philippines show a similar trend, although in Malaysia there was a slight increase in physical and human capital accumulation rates from the mid-2000s. In Thailand, physical and human capital accumulation peaked in the early 1990s and decreased until the late 1990s, while natural capital depletion rose noticeably over the same period. These data reflect how some countries, such as Philippines and Thailand, have experienced surging energy and mineral depletion rates without a corresponding increase in physical and human capital accumulation, which bodes ill for sustainability.

Efficient forms of taxation may not be easy to devise for the extractive industries, as taxes affect all different stages of mining activities: exploration, development and production. Inefficient forms of taxation can greatly distort these choices, reducing industry profits while raising insufficient revenue for government. Making extractive industries more transparent will allow the authorities to design efficient forms of taxation based on full information on the private and social costs of mining activities. The complexity of the fiscal regime often makes transparency challenging, however. These include multiple taxes, contract confidentiality, complicated and inefficient payment procedures, responsibilities for returns and payments fragmented across different agencies, and revenues paid in kind. These all contribute to the opacity of extractive sector and make it difficult to ascertain whether the government is receiving an adequate share of the revenues.

In the ASEAN nations – as in many other developing and developed countries – the fiscal regime for the extractive sector consists of tax/royalty systems and contractual schemes (such as production sharing or service contracts). Indonesia pioneered production sharing contracts in the 1960s. Both regimes are common in the oil and gas sectors, whereas taxes and royalties are more common in mining; some countries use a mix of the two.

Both types of system can be combined with state participation through state-owned enterprises.²¹ State participation is common in Southeast Asia countries and is often motivated by non-fiscal reasons, such as a desire for direct ownership and control over natural resources and to facilitate knowledge transfers among shareholders. While the latter is a worthwhile objective, its actual achievement depends on the degree of efficiency of state-owned enterprises and their level of protection from market forces. An alternative form of payment to government involves construction by the investor of physical infrastructure (witness China’s recent investments in developing countries). Building infrastructure as a form of payment requires cost-benefit analyses to gauge the value of the infrastructure contributions, taking into account the allocation of risks between parties, and comparing it with the estimated royalties or taxes the government has foregone.

Figure 3.16. **Mismatches between natural resource use and accumulation of physical and human capital**
Percent gross national income (GNI)



StatLink <http://dx.doi.org/10.1787/888933168012>

Note: Five-year moving averages; the physical and human capital accumulation is computed as the sum of net national savings and education expenditure; the right axis shows energy and mineral depletion rates; the energy and mineral depletion rates are inverted (a higher value corresponds to higher depletion rates); energy depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil, and natural gas; mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.

Source: Author's calculations based on World Bank World Development Indicators, <http://data.worldbank.org/data-catalog/world-development-indicators>, accessed September 2014.

A resource rent tax is a more efficient and simpler form of taxation for extractive industries than the alternatives, such as standard corporate taxes, royalties and infrastructure building. Resource rent taxes maximise the net present value of government revenues from extractive industries as they are less distortive than other forms of taxes and direct government control. Rents can be defined as the excess revenues above all costs of exploitation, discovery and development plus the normal rate of return on equity. Rent taxes are therefore paid only by those companies whose return is above the pre-agreed normal rate of return; the revenues accruing to the government increase with the project's return, either due to higher prices or lower costs, contrary to bonus payments and royalties (IMF, 2012). Overall, extractive industries' rents offer an attractive tax base on efficiency and equity grounds.

In a world of perfect information, rents could be taxed at 100% without making operators in extractive industries unprofitable and jeopardising their incentives - as they would still receive the normal rate of return. However, as asymmetric information and uncertainty are endemic in extractive industries such a high tax rate is unfeasible.²² International tax competition also militates against full taxation of rents. Although mineral deposits are immobile, a dearth of technical expertise and specialist equipment often restricts the number of projects that can be undertaken; then extractive industries companies will prefer projects in countries offering more favourable tax treatment (IMF, 2012).

Despite their positive aspects, resource rent taxes are not commonly used in either developing or developed countries. Governments often rely on alternative types of taxation for different reasons. For instance, political myopia may lead governments to prefer revenues to accrue in the early stages of the project and not to wait until rents are generated (which may take years). Also, resource rent taxation needs be based on extensive information on all costs at all stages of production, beginning with exploration (including unsuccessful ones). A recent International Monetary Fund study encompassing developed and developing countries shows that in the mining sector only 5 out of 25 countries use some form of resource rent taxation, whereas in the oil sector 9 out of 67 do so (IMF, 2012).

No Southeast Asian country has so far introduced a resource rent tax. In order to maximise tax receipts from extractive industries and collect tax revenues in the early stages of mining projects, Southeast Asian governments could consider a fiscal regime based on an *ad valorem* royalty, a corporate income tax and a resource rent. Royalties would ensure that revenues accrue to the government at an early stage – as soon as production starts – while the corporate income tax would make sure the normal rate of return to equity is taxed as in any other sector.

3.6. Sustainable resource management requires good data

Achieving the sustainable management of Southeast Asia's natural capital is paramount for moving towards a green growth path. ASEAN countries are richly endowed with natural resources, spanning from oil, gas and minerals to forests, fisheries and an astonishing wealth of biodiversity. Natural resources already contribute greatly to the wealth and growth of ASEAN countries. Ensuring that they continue to sustain welfare gains for the whole population will require policies to preserve key aspects of natural capital, while at the same time ensuring their exploitation contributes to long-term economic growth.

This chapter has reviewed current exploitation practices of four kinds of important natural resources in Southeast Asia, namely forests, fisheries, energy and minerals, with the intent to identify the policies and institutions that may contribute to their sustainable exploitation. To summarise, the sustainable management of renewable natural resources will need:

- to take an ecosystem approach which recognises the broad range of services natural resources provide to society and the economy
- appropriate property rights regimes and management practices that empower local populations and allow them to benefit from sustainable use.
- greater use of payments for ecosystem services to provide adequate incentives and compensation for natural resource conservation.
- effective policies to contain the environmental impact of non-renewable resource exploitation, such as minerals, and to promote the accumulation of human and physical capital so as to compensate for the depletion of their non-renewable natural asset base.

The effectiveness of this array of policies and institutions will hinge crucially on a set of indicators that monitor the quantity, quality and value of natural resources. Indicators will need to cover (OECD, 2014):

- the availability and quality of renewable natural resource stocks, including fresh water, forests and fish
- the availability and accessibility of non-renewable natural resource stocks, particularly mineral resources such as metals, industrial minerals and fossil energy carriers
- the biological diversity and ecosystems, including species and habitat diversity and the productivity of land and soil resources.

Worldwide, the information available for assessing countries' natural asset base is generally incomplete and of varying quality (OECD, 2014). Southeast Asian countries are no exception. Progress in this dimension requires data and indicators reflecting the extent to which natural resources are being exploited, in terms of their quantity and quality.

The OECD has been developing a set of green growth indicators to monitor the natural asset base (OECD, 2011b; OECD, 2014). This study has extended these indicators to Southeast Asian countries (see Table 1.6 in Chapter 1). The further development of these indicators will eventually help countries to assess whether the natural asset base is being kept intact or at least within sustainable thresholds in terms of quantity and quality. Ideally, they should help identify risks to future growth arising from a declining or degraded natural asset base.

Green growth indicators monitoring the natural asset base can usefully complement the adjusted wealth and net saving measures introduced at the start of this chapter. Practical applications of adjusted wealth measures mentioned earlier suffer from limitations common to other composite indicators. Social valuations of different kinds of natural, produced and human capital should ideally depend on their marginal substitutability so as to attribute a difficult-to-substitute natural resource a high relative price. However, obtaining accurate social valuations is challenging and marginal social valuations can be state and time dependent. Moreover, wealth accounting is unlikely to provide a complete assessment of the economic value of natural capital as some aspects, notably ecosystem services, cannot

yet be properly quantified. As highlighted in Box 3.1, the effect of natural capital depletion on human welfare and the economy may be highly non-linear as there may be critical thresholds that once passed could yield permanent changes with negative and difficult-to-quantify consequences on the environment and human wellbeing. Finally, when a resource is being depleted its value can rise – providing further incentives for even more rapid depletion. Its contribution to total wealth might also increase, thus giving a misleading picture of the sustainability of current exploitation practices.²³

The applicability, reliability and completeness of wealth accounting and green growth indicators should improve over time. Together, they will be useful to design and implement policies leading to sustainable management of natural resources (GGKP, 2013). More specifically, green growth indicators and wealth accounting can contribute towards the implementation of natural capital accounting, whose main aim is to properly evaluate all aspects of natural capital – including ecosystem services, which are not generally traded in markets – and their contribution to the economy. Natural capital accounting has been around for more than 30 years but progress in implementing it has been slow. The UN Statistical Commission has developed the System for Environmental-Economic Accounts (SEEA), which provides an internationally agreed method, on par with the current System of National Accounts, to account for material natural resources such as minerals, timber and fisheries. Forms of natural capital accounting have been around for more than 30 years – including wealth accounting (Barbier, 2013); environmental asset accounting (Stoneham et al., 2012) and environmental accounting (Bartelmus, 2004). Recent governmental efforts include the UN's System of Environmental-Economic Accounting (SEEA), while the Natural Capital Control Framework has been set up for businesses.²⁴

Natural capital accounting can provide statistics to underpin the better management of natural resources and the economy. For instance, land and water accounts can help countries to assess the value of competing land uses. Ecosystem accounts can be instrumental in the design of development strategies that take into account the trade-offs among agriculture, subsistence livelihoods, ecotourism and ecosystem services. Ecosystems accounting can also help to identify who benefits and who bears the cost of ecosystem changes, thus helping governments to take into account distributional aspects when designing green growth strategies.

The Wealth Accounting and Valuation of Ecosystem Services (WAVES) is a global partnership launched by the World Bank in 2010. It has been supporting a number of countries as they prepare to implement natural capital accounting based on the SEEA. Among the eight core implementing countries of the WAVES partnership, two are from Southeast Asia: the Philippines and Indonesia. In the Philippines, work has begun on ecosystem accounting for two pilot sites (Laguna Lake Basin and Southern Palawan). Moreover, mineral accounts are being developed with an emphasis on the sharing of benefits from mineral resource exploitation and its impacts on local communities. Mangrove accounts are also planned for 2015, on account of increased interest in protection of coastal areas from cyclones following the catastrophic Typhoon Haiyan in 2013 (WAVES, 2014).

The more widespread development and implementation of natural capital accounting in Southeast Asia, along with green growth indicators, would be a step in the right direction towards sustainable management of natural resources. Many issues in natural resource management span national borders and can be best dealt with through a regional perspective, such as forest and biodiversity protection in the Greater Mekong Subregion, and the management of fisheries. Collecting data and reliable scientific information on

the state of national resources at regional level under a unified framework will facilitate the design and implementation of green growth policies that take into account the transboundary effects of natural resource use.

Notes

1. The index considers net national monetary savings; education expenditure to capture human capital accumulation; the change in natural resource stock as indicated by energy sources; mineral and net forest depletion; and air pollution damage due to particulate emissions.
2. See <http://data.worldbank.org/indicator/ER.BDV.TOTL.XQ>.
3. Overall, the total forested land across ASEAN countries is higher than in China. With more than 900 000 square kilometres of forest, Indonesia has the largest forest cover of all Southeast Asian countries. Myanmar also has substantial forest cover.
4. The investment tax allowance permits companies undertaking forest planation projects to use 100% of capital expenditure to exempt up to 100% of the statutory income from corporate taxes.
5. For instance, afforestation of agricultural land adjacent to primary forests can enhance conservation by providing complementary forest habitat and increasing connectivity with other natural forests. On the contrary, conversion of natural forests and afforestation of natural non-forest land is detrimental to biodiversity.
6. Infrastructure development figures prominently in the Greater Mekong Subregion programme, which involves the Mekong region governments, the Asian Development Bank, and the private sector.
7. Decentralisation of forest management has usually coincided with political decentralisation programmes (Rola and Coxhead, 2005). Notably, in the Philippines a 1995 presidential order officially adopted CBFM as the country's strategy for sustainable forest management (Guiang et al., 2001). In Viet Nam, the 1993 Land Law attributed user rights to communities and individuals, leaving ownership to the state, while a modification to the law in 2004 allowed for community forest ownership (Sunderlin and Ba, 2005).
8. Much of the CBFM has been created through the Certificate of Ancestral Domain Claim programme and the Certificate of Stewardship Contract, whereby forest dwellers can obtain rights to exclusively use and occupy publicly owned forested land on the condition of taking responsibility for forest and soil conservation and forest fire control (Magno, 2003).
9. These include water source regulation and provision, soil protection, reduction of erosion, protection against sedimentation of reservoirs and ecotourism-related environmental services.
10. Three-way co-operation between Brunei Darussalam, Indonesia and Malaysia is underway to protect the forests of Borneo. This includes proposed PES schemes such as water catchment service payments (in Indonesia), biodiversity offset payments through the sales of Biodiversity Conservation Certificates (in Malaysia) and bio prospecting (in Brunei Darussalam).
11. Catch-share holders may also increase their profits by exploiting seasonal price fluctuations by timing fishing with higher seasonal prices.
12. Other important issues concern the use of medicines, hormones and genetic engineering.

13. This is consistent with the global trend of coal technologies continuing to dominate the growth in power generation and the reason why the amount of CO₂ emitted for each unit of energy supplied has fallen by less than 1% since 1990 (IEA, 2013b).
14. In some Southeast Asian countries a large share of the population is still without an electricity connection. The share of the population without electricity is 66% in Cambodia, 51% in Myanmar, 30% in the Philippines, 27% in the Indonesia, 22% in Lao PDR, 4% in Viet Nam, 1% in Thailand and Malaysia. Brunei Darussalam and Singapore enjoy a 100% electrification rate (IEA, 2013a).
15. This is a non-exhaustive list, drawn from the online IEA's database on renewable-energy policy instruments available at www.iea.org/policiesandmeasures/renewableenergy/.
16. China and Myanmar are also partners of the MRC.
17. Unbundling exemptions are when operators are allowed to keep the ownership and management of the physical network while at the same time being able to sell services over the network; the main principle is to separate these two activities.
18. Stocks are proxied by production data. Under well-functioning markets, minerals production should be a good proxy of stocks. Exceptions are economies such as Myanmar, where extractive industries are not yet well developed and therefore production underestimates actual minerals' stock.
19. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.
20. See www.asean.org/news/item/asean-declaration-on-environmental-sustainability.
21. However, the right type of taxation and regulation can generate the same outcome as direct government participation (Sims, 1985).
22. For instance, asymmetric information about production costs imply that the government does not observe the actual costs for operators; disclosure rules can help alleviate but not eliminate this problem. Also, uncertainty about discovery and development coupled with high tax rates can make projects unprofitable, damaging incentives for further investment.
23. Mason et al. (2012) provide evidence on this vicious cycle for some endangered species.
24. More information can be found at www.naturalcapitalcoalition.org/about/how/natural-capital-protocol.html.

Annex 3.A1

Mineral, oil and gas resources in ASEAN countries


Southeast Asian countries have conspicuous fossil fuel energy resources, especially in coal and gas. These are concentrated in Brunei Darussalam, Indonesia, Malaysia, Thailand and Viet Nam, which in 2011 accounted for more than 90% of the 537 million tonnes of oil equivalent (mtoe) of fossil fuel production. A large share of ASEAN countries' fossil fuel deposits are still unexplored, with almost two-thirds of recoverable oil resources and over three-quarters of recoverable gas resources still untapped. Cambodia, Lao PDR, Myanmar, Singapore and the Philippines lack sizeable fossil fuel deposits. However, Myanmar appears to have large and largely unexplored gas reserves, while Cambodia, Laos, and the Philippines – in addition to Myanmar – have substantial renewable energy potential, mainly in the form of geothermal and hydro.

Coal is concentrated in a few countries

In 2011, Southeast Asia had 2.7% of the world's total coal reserves (IEA, 2013a). Viet Nam and Indonesia are the ASEAN countries with the largest coal reserves (recoverable coal resources under current technologies), accounting for more than 90% of the region's reserves (Table 3.A1). Their share in the region's total coal resources is even more significant, at 98%.

Table 3.A1.1. **Coal resources by country and type**
Billion tonnes, 2011

Country	Hard coal reserves	Hard coal resources	Brown coal reserves	Brown coal resources	Total coal reserves	Total coal resources
Indonesia	13.5	73.3	9.0	19.0	22.5	92.3
Viet Nam	3.1	3.5	0.2	199.9	3.4	203.4
Rest of ASEAN	0.4	2.4	1.7	2.2	2.1	4.6
Total ASEAN	17.0	79.2	11.0	221.1	27.9	300.3
Share of ASEAN in world total	2.30%	0.50%	3.90%	5.30%	2.70%	1.40%

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Note: Total coal reserves and resources are calculated as the sum of hard coal and brown coal reserves and resources. Hard coal includes anthracite and bituminous coal; brown coal includes sub-bituminous coal and lignite. Steam coal, also known as thermal coal, refers to anthracite, bituminous coal not used as coking coal and sub-bituminous coal.

Sources: BGR (2012), *Energierohstoffe 2012, Reserven, Ressourcen, Verfügbarkeit, Tabellen* (Energy Resources 2012, Reserves, Resources, Availability, Tables), BGR, Hannover, Germany; IEA (2013a), *Southeast Asia Energy Outlook*, OECD/IEA, Paris.

Oil and gas are more evenly spread but oil reserves are dwindling


Southeast Asia is a mature oil-producing region, with most countries facing decline in large mature fields and limited prospects of new discoveries. Its share of proven oil reserves is only 0.8 % of the world total (IEA, 2013a). Oil resources are more evenly distributed across the region than coal resources with five countries accounting for more than 95% (Table 3.A1.2). Viet Nam and Malaysia each own around one-third of these reserves, followed by Indonesia, Brunei Darussalam and Thailand. Oil reserves *per capita* are the highest in Brunei Darussalam, almost 20 times as high as in Malaysia and more than 50 times as high as in Viet Nam. In addition to meeting the country's energy demand, oil reserves are the main export commodity in Brunei Darussalam.

More than half of ultimately recoverable oil resources in Southeast Asia are located in Indonesia, which has also the largest remaining recoverable stock.¹ Malaysia, Viet Nam and Thailand each have over 10% of remaining recoverable resources. At the same time, cumulative production of oil to date has been three to four times higher in Malaysia than in Viet Nam and Thailand. Malaysia's domestic demand for oil is forecast to overtake its production by the end of the decade.

Southeast Asia is also rich in natural gas. In 2012, Southeast Asia had 7.5 trillion cubic metres of proven gas reserves, representing 3.5% of the world total (Table 3.A1.2). The distribution of gas deposits within the region follows a similar pattern as oil. Notably,

Table 3.A1.2. Oil and gas resources by country
end 2012

	Oil (billion barrels)	Gas (trillion cubic metres)	Oil (billion barrels)	Gas (trillion cubic metres)	Oil (billion barrels)	Gas (trillion cubic metres)	Oil (billion barrels)	Gas (trillion cubic metres)
Brunei Darussalam	1.1	0.4	8.4	1.4	3.7	0.4	4.7	1.0
Indonesia	2.7	3.1	61.4	17.7	24.3	2.1	37.1	15.7
Malaysia	4.0	2.4	17.9	7.3	8.2	1.1	9.7	6.2
Philippines	0.1	0.1	1.3	0.4	0.2	0	1.1	0.3
Thailand	0.5	0.3	9.9	1.2	2	0.5	8	0.7
Viet Nam	4.4	0.7	12	1.6	2.2	0.1	9.7	1.5
Rest of ASEAN	0.1	0.5	2.7	1.5	0.6	0.2	2.1	1.3
Total ASEAN	12.9	7.5	113.6	31.0	41.2	4.3	72.3	26.6
Share of ASEAN in world total	0.80%	3.50%	1.70%	3.50%	3.30%	4.00%	1.40%	3.40%

StatLink  <http://dx.doi.org/10.1787/888933168304>

Notes: Proven reserves are usually defined as discovered volumes having a 90% probability that they can be extracted profitably. Ultimately recoverable resources comprises cumulative production, proven reserves, reserves growth (the projected increase in reserves in known fields) and as yet undiscovered resources that are judged likely to be ultimately producible using current technology. Remaining recoverable resources are equal to the ultimately recoverable resources less cumulative production.

Source: BGR (2012), *Energierohstoffe 2012, Reserven, Ressourcen, Verfügbarkeit, Tabellen* (Energy Resources 2012, Reserves, Resources, Availability, Tables), BGR, Hannover, Germany; Oil & Gas Journal (2012), "Worldwide Look at Reserves and Production", *Oil & Gas Journal*, Pennwell Corporation, Oklahoma City, OK, United States; USGS (2000), *World Petroleum Assessment*, USGS, Boulder, United States; USGS (2012), "An Estimate of Undiscovered Oil and Gas Resources of the World", Fact Sheet FS2012-3042, USGS, Boulder, United States; IEA (2013a), *Southeast Asia Energy Outlook*, OECD/IEA, Paris.

Indonesia owns more than half of the remaining recoverable gas resources in the whole ASEAN, even if the vast majority of this has not yet been proven to be profitably extractable. Malaysia owns a quarter of recoverable gas resources remaining in the ASEAN, of which a third are proven reserves. Many of Southeast Asia's profitably extractable gas resources are located offshore and there is also potential for unconventional gas.

Note

1. Ultimately recoverable resources comprise cumulative production, proven reserves, reserves growth (the projected increase in reserves in known fields) and as yet undiscovered resources that are judged likely to be ultimately recoverable using current technology.

Bibliography

- ADB (2014), "Power Transmission and Distribution Improvement Project", *Project Data Sheet*, Asian Development Bank, Manila, www.adb.org/projects/46390-002/details, accessed June 2014.
- Agnew, D.J. et al. (2009), "Estimating the worldwide extent of illegal fishing", *PLoS ONE*, Vol. 4(2), e4570.
- Allison, E.H. et al. (2009), "Vulnerability of national economies to the impacts of climate change on fisheries", *Fish and Fisheries*, Vol. 10(2), 173-196.
- Angelsen, A. (2010), "Policies for reduced deforestation and their impact on agricultural production", *PNAS*, Vol. 107(46), 19639-19644.
- Angelsen, A. and T.K. Rudel (2013), "Designing and implementing effective REDD + policies: a forest transition approach", *Review of Environmental Economics and Policy*, Vol. 7(1), 91-113.
- Arrow, K. et al. (2004), "Are we consuming too much?", *The Journal of Economic Perspectives*, Vol. 18(3), 147-172.
- Arrow, K.J. and A.C. Fisher (1974), "Environmental preservation, uncertainty, and irreversibility", *The Quarterly Journal of Economics*, Vol. 88(2), 312-319.
- Asia Forest Network (2014), *Community Forest Management in the Philippines: Policy and Implementation Environment*, Asia Forest Network, Bohol, Philippines, available at: www.asiaforestnetwork.org/phi.htm, accessed in April 2014.
- Barbier, E.B. (2013), "Wealth accounting, ecological capital and ecosystem", *Environment and Development Economics*, Vol. 18 (2), 133-161.
- Barbier, E.B. (2007), *Natural Resources and Economic Development*, Cambridge University Press, Cambridge.

- Barbier, E.B. (2004), “Explaining agricultural land expansion and deforestation in developing countries”, *American Journal of Agricultural Economics*, Vol. 86(5), 1347-1353.
- Bartelmus, P. (2004), “Green accounting and energy”, *Encyclopaedia of Energy*, Elsevier.
- Bernard, F. et al. (2013), *Towards a Landscape Approach for Reducing Emissions: Substantive report of Reducing Emissions from All Land Uses (REALU) Project*, World Agroforestry Centre, Nairobi.
- BGR (2012), *Energierohstoffe 2012, Reserven, Ressourcen, Verfügbarkeit, Tabellen (Energy resources 2012, reserves, resources, availability, tables)*, BGR, Hanover.
- Boucher, D. et al. (2011), *The Root of the Problem: What’s driving tropical deforestation today?*, Union of Concerned Scientists (UCS), Cambridge, MA.
- Boucher, D., S. Roquemore and E. Fitzhugh (2013), “Brazil’s success in reducing deforestation”, *Tropical Conservation Science*, Vol. 6 (3), 426-445.
- Brocknerhoff, E.G. et al. (2008), “Plantation forests and biodiversity: oxymoron or opportunity?”, *Biodiversity and Conservation*, Vol. 17(5), 925-951.
- Cabeza Gutiérrez, M. (1996), “The concept of weak sustainability”, *Ecological Economics*, Vol. 17(3), 147-156.
- Carpenter, S.R. et al. (2009), “Science for managing ecosystem services: beyond the Millennium Ecosystem Assessment”, *PNAS*, Vol. 106(5), 1305-1312.
- Castillo, G. and E.S. Guiang (2005), *Trends in Forest Ownership, Forest Resources Tenure and Institutional Arrangements in the Philippines: Are they contributing to better forest management and poverty reduction?*, Food and Agriculture Organization of the United Nations, Rome, available at www.fao.org/forestry/10543-03d5a1b99b199bb5b040e70eba8414526.pdf.
- Chang, Y. and Y. Li (2012), “Cross-border power trade and implications in ASEAN”, in Y. Wu, X. Shi and F. Kimura (eds.), *Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies*, ERIA Research Project Report 2011, No. 17, Economic Research Institute for ASEAN and East Asia, Jakarta.
- Chomitz, K. (2007), *At Loggerheads? Agricultural expansion, poverty reduction, and environment in the tropical forests*, World Bank, Washington, DC.
- Christie, P. (2004), “Marine Protected Areas as biological successes and social failures in Southeast Asia”, *American Fisheries Society Symposium*, Vol. 42, 155-164.
- Christie, P., A. White, and E. Deguit (2002), “Starting point or solution? Community-based Marine Protected Areas in the Philippines”, *Journal of Environmental Management*, Vol. 66(4), 441-454.
- Clements, T. et al. (2010), “Payments for biodiversity conservation in the context of weak institutions: comparison of three programs from Cambodia”, *Ecological Economics*, Vol. 69(6), 1283-1291.
- Corbett, J. (2008), Paper parks and paper partnerships: lessons for protected areas and biodiversity corridors in the Greater Mekong Sub-region”, *The World Conservation Union*, Geneva, available at <http://lad.nafri.org.la/fulltext/2142-0.pdf>.

- Corrigan, C.C. (2014), “Breaking the resource curse: transparency in the natural resource sector and the Extractive Industries Transparency Initiative”, *Resources Policy*, Vol. 40, 17-30.
- Costello, C. et al. (2012), “The economic value of rebuilding fisheries”, *OECD Food, Agriculture and Fisheries Papers*, No 55, OECD, Paris.
- Costello, C. et al. (2010), “Economic incentives and global fisheries sustainability, *Annual Review of Resource Economics*”, 2(1), 299-318.
- Dahal, G.R., and K.P. Adhikari (2008), “Trends and impact of forest tenure reforms in Asia: Cases from India, Indonesia, Lao PDR, Nepal and the Philippines”, *Journal of Forest and Livelihood*, Vol. 7(1), 19-26.
- Damette, O. and P. Delacote (2011), “Unsustainable timber harvesting, deforestation and the role of certification”, *Ecological Economics*, Vol. 70(6), 1211-1219.
- EITI (2013), *The EITI Standard*, The Extractive Industries Transparency Initiative International Secretariat, Oslo.
- Ekens, P. et al. (2003), “A framework for the practical application of the concepts of critical natural capital and strong sustainability”, *Ecological Economics*, Vol. 44(2–3), 165-185.
- Epstein, L.S. (1980), “Decision-making and the temporal resolution of uncertainty”, *International Economic Review*, Vol. 21 (2), 269-283.
- FAO (2011), *Southeast Asian Forests and Forestry to 2020*, Food and Agriculture Organization of the United Nations, Bangkok.
- FAO (2006), “Understanding forest tenure in South and Southeast Asia”, *FAO, Forest Policy and Institutions Working Paper 14*, FAO, Rome.
- GGKP (2013), *Moving Towards a Common Approach on Green Growth Indicators*, Green Growth Knowledge Platform, available at www.greengrowthknowledge.org/resource/moving-towards-common-approach-green-growth-indicators.
- Gibbs, H.K. et al. (2010), “Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s”, *PNAS*, Vol. 107(38), 16732-16737.
- Guiang, E.S., S.B. Borlagdan and J.M. Pulhin (2001), *Community-based Forest Management in the Philippines: A preliminary assessment*, Institute of Philippine Culture Ateneo de Manila University, Quezon City.
- Gulbrandsen, L.H. (2009), “The emergence and effectiveness of the Marine Stewardship Council”, *Marine Policy*, Vol. 33(4), 654-660.
- Hamilton, M. (2012), “Perceptions of fishermen towards Marine Protected Areas in Cambodia and the Philippines”, *Bioscience Horizons*, Vol. 5, available at <http://biohorizons.oxfordjournals.org/content/5/hzs007.full>.
- Hansen, M.C. et al. (2013). “High-resolution global maps of 21st-century forest cover change”, *Science*, Vol. 342(6160), 850-853.
- Hardin, G. (1968), “The tragedy of the commons”, *Science*, Vol. 162(3859), 1243-1248.
- Harris, N.L. et al. (2012), “Baseline map of carbon emissions from deforestation in tropical regions”, *Science*, Vol. 336(6088), 1573-1576.
- Hartwick, J.M. (1977), “Intergenerational equity and the investment of rents from exhaustible resources”, *American Economic Review*, Vol. 67, 972-74.

- Hooijer A. et al. (2010), “Current and future CO₂ emissions from drained peatlands in Southeast Asia”, *Biogeosciences*, Vol. 7, 1505-1514.
- Hosch, G., G. Ferraro, and P. Failler (2011), “The 1995 FAO Code of Conduct for Responsible Fisheries: adopting, implementing or scoring results?”, *Marine Policy*, Vol. 35(2), 189-200.
- IEA (2013a), *Southeast Asia Energy Outlook*, OECD/International Energy Agency, Paris.
- IEA (2013b), *Tracking Clean Energy Progress*, OECD/IEA, Paris.
- IEA (2011), *World Energy Outlook 2011*, OECD/IEA, Paris.
- IEA (2010), *Deploying Renewables in Southeast Asia: Trends and Potentials*, OECD/IEA, Paris.
- IMF (2012), *Fiscal Regimes for Extractive Industries: Design and implementation*, International Monetary Fund, Washington, DC, available at www.imf.org/external/np/pp/eng/2012/081512.pdf.
- Ingram, J.C. et al. (2014), “Evidence of Payments for Ecosystem Services as a mechanism for supporting biodiversity conservation and rural livelihoods”, *Ecosystem Services*, Vol. 7, 10-21.
- Kerr, S.C. (2013), “The economics of international policy agreements to reduce emissions from deforestation and degradation”, *Review of Environmental Economics and Policy*, Vol. 7(1), 47-66.
- Laganière, J., D.A. Angers and D. Paré (2010), “Carbon accumulation in agricultural soils after afforestation: a meta-analysis”, *Global Change Biology*, Vol. 16(1), 439-453.
- Lovells (2009), *Vietnam’s Independent Power Producers Sector: Toward market liberalisation*, Lovells LLP, London, available at www.lovells.com.
- Lubowski, R.N., and S.K. Rose (2013), “The potential for REDD+: key economic modelling insights and issues”, *Review of Environmental Economics and Policy*, Vol. 7(1), 67-90.
- Magno, F. (2003), “Forest devolution and social capital: state-civil society relations in the Philippines”, in A. Contreras (ed.), *Creating Space for Local Forest Management in the Philippines*, La Salle Institute of Governance, La Salle University, Manila.
- Mason, C.F., E.H. Bulte, and R.D. Horan (2012), “Banking on extinction: endangered species and speculation”, *Oxf. Rev. Econ. Policy*, Vol. 28(1), 180-192.
- McManus, J.W. (1997), Tropical marine fisheries and the future of coral reefs: a brief review with emphasis on Southeast Asia, *Coral Reefs*, Vol. 16(1), S121-S127.
- Mendonça, M. and D. Jacobs (2009), Feed-in Tariffs Go Global – Policy in Practice, Renewable Energy World online, available at www.renewableenergyworld.com/rea/news/article/2009/09/feed-in-tariffs-go-global-policy-in-practice, accessed 24 September 2014.
- Meyfroidt, P. and E.F. Lambin (2009), “Forest transition in Vietnam and displacement of deforestation abroad”, *PNAS*, Vol. 106(38), 16139-16144.
- Miettinen J., C. Shi and S.C. Liew (2011), “Deforestation rates in insular Southeast Asia between 2000 and 2010”, *Global Change Biology*, 17: 2261-2270.

- Nasi, R. et al. (2008), “Impact of landscape and corridor design on primates in a large-scale industrial tropical plantation landscape”, *Biodiversity and Conservation*, Vol. 17(5), 1105-1126.
- Nasuchon, N., and A. Charles (2010), “Community involvement in fisheries management: experiences in the Gulf of Thailand countries”, *Marine Policy*, Vol. 34(1), 163-169.
- Neumayer, E. (2003), *Weak versus Strong Sustainability: Exploring the limits of two opposing paradigms*, Fourth Edition, Edward Elgar Publishing, Cheltenham.
- Nguyen, Q.T. (2011), “Payment for environmental services in Vietnam: an analysis of the pilot project in Lam Dong Province”, *Institute for Global Environmental Strategies (IGES) Occasional Paper*, No. 5, Kanagawa, Japan.
- Nolte, C. et al. (2013), “Governance regime and location influence avoided deforestation success of protected areas in the Brazilian Amazon”, *PNAS*, Vol. 110(13), 4956-4961.
- Oil & Gas Journal (2012), “Worldwide look at reserves and production”, *Oil and Gas Journal*, Pennwell Corporation, Oklahoma City.
- Obidzinski, K. (2013), *Fact file – Indonesia world leader in palm oil production*, Center for International Forestry Research (CIFOR), Bogor, Indonesia, available at <http://blog.cifor.org/17798/fact-file-indonesia-world-leader-in-palm-oil-production>.
- OECD (2014), *Green Growth Indicators 2014*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264202030-en>.
- OECD (2013a), *OECD Economic Surveys: Brazil 2013*, OECD, Paris.
- OECD (2013b), *Scaling-up Finance Mechanisms for Biodiversity*, OECD Publishing, <http://dx.doi.org/10.1787/9789264193833-en>.
- OECD (2013c), *The OECD Policy Guidance for Investment in Clean Energy Infrastructure*, OECD, Paris, www.oecd.org/daf/inv/investment-policy/CleanEnergyInfrastructure.pdf.
- OECD (2012), *OECD Review of Agricultural Policies: Indonesia 2012*, OECD Publishing, <http://dx.doi.org/10.1787/9789264179011-en>.
- OECD (2011a), *The Economics of Adapting Fisheries to Climate Change*, OECD Publishing, <http://dx.doi.org/10.1787/9789264090415-en>.
- OECD (2011b), *Towards Green Growth: Monitoring Progress, OECD Indicators*, OECD, Paris, www.oecd.org/greengrowth/48224574.pdf.
- OECD (2010a), *Paying for Biodiversity: Enhancing the Cost-Effectiveness of Payments for Ecosystem Services*, OECD Publishing, <http://dx.doi.org/10.1787/9789264090279-en>.
- OECD (2010b), *Globalisation in Fisheries and Aquaculture: Opportunities and challenges*, OECD Publishing, <http://dx.doi.org/10.1787/9789264074927-en>.
- OECD (2006), *Policy Framework for Investment*, OECD Publishing, <http://dx.doi.org/10.1787/9789264018471-en>.
- Ostrom, E. (1990), *Governing the Commons: The evolution of institutions for collective action*, Cambridge University Press, Cambridge.
- Pattanayak, S.K., S. Wunder and P.J. Ferraro (2010) “Show me the money: do payments supply environmental services in developing countries?”, *Rev Environ Econ Policy*, Vol. 4(2), 254-274.

- Pearce, D.W. and G.D. Atkinson (1993), “Capital theory and the measurement of sustainable development: an indicator of ‘weak’ sustainability”, *Ecological Economics*, Vol. 8(2), 103-8.
- Pfaff, A., G.S. Amacher and E.O. Sills (2013), “Realistic REDD: improving the forest impacts of domestic policies in different settings”, *Review of Environmental Economics and Policy*, Vol. 7(1), 114-135.
- Pham, M.C. (2012), “Development of a national forest monitoring system for REDD+ in Vietnam”, in Mora, B. et al. (eds.), *Capacity Development in National Forest Monitoring*, Centre for International Forestry Research, Bogor, Indonesia.
- Pisu, M. (2010), “Tackling the infrastructure challenge in Indonesia” *OECD Economics Department Working Papers* 809, OECD, Paris.
- Pitcher T.J. et al. (2008), *Safe Conduct? Twelve years fishing under the UN Code*, World Wide Fund for Nature, Gland.
- Poch, K., and S. Tuy (2012), “Cambodia’s Electricity Sector in the Context of Regional Electricity Market Integration”, in Y. Wu, X. Shi, and F. Kimura (eds.), *Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies*, ERIA, Jakarta.
- Poffenberger, M. (2006), “People in the forest: community forestry experiences from Southeast Asia”, *International Journal of Environment and Sustainable Development*, Vol. 5(1), 57-69.
- Pomeroy, R.S. et al. (2007), “Fish wars: conflict and collaboration in fisheries management in Southeast Asia”, *Marine Policy*, Vol. 31(6), 645-656.
- Pomeroy, R.S. (1995), “Community-based and co-management institutions for sustainable coastal fisheries management in Southeast Asia”, *Ocean and Coastal Management*, Vol. 27(3), 143-162.
- Pomeroy, R.S. et al. (1996), “Impact evaluation of community-based coastal resource management projects in the Philippines”, *Naga*, Vol. 19(4), 9-12.
- Pulhin, J.M. and W.H. Dressler (2009), “People, power and timber: the politics of community-based forest management”, *Journal of Environmental Management*, 91(1), 206-214.
- Ricketts, T.H., et al. (2010) “Indigenous lands, protected areas, and slowing climate change”, *PLoS Biology*, Vol. 8(3): e1000331.
- Roberts, C.M. et al. (2002), “Marine biodiversity hotspots and conservation priorities for tropical reefs”, *Science*, Vol. 295(5558), 1280-1284.
- Rockstrom et al. (2009), “Planetary boundaries: exploring the safe operating space for humanity”, *Ecology and Society*, 14(2): 32.
- Rola, A.C. and I. Coxhead (2005), “Economic development and environmental management in the uplands of Southeast Asia: challenges for policy and institutional development”, *Agricultural Economics*, Vol. 32, 243-256.
- Saleh, I.B. (2008), *Final Project Evaluation Integrated Coastal Resources Management in Pulau Langkawi (ICRM-PL) Implemented by Training Department*, Southeast Asian Fisheries Development Center and the Department of Fisheries, Kuala Lumpur, Malaysia.

- Sandker, M., M. Ruiz-Perez and B.M. Campbell (2012), “Trade-offs between biodiversity conservation and economic development in five tropical forest landscapes”, *Environmental Management*, Vol. 50(4), 633-644.
- Sathaye, J., K. Andrasko and P. Chan (2011), “Emissions scenarios, costs, and implementation considerations of REDD-plus programs”, *Environment and Development Economics*, Vol. 16 (Special Issue 04), 361-380.
- Schulze, E.-D., C. Wirth and M. Heimann (2000), “Managing forests after Kyoto”, *Science*, 289(5487), 2058-2059.
- Shi, X. and C. Malik (2013), “Assessment of ASEAN energy cooperation within the ASEAN Economic Community”, *ERIA Discussion Paper Series*, No. 37, Economic Research Institute for ASEAN and East Asia, Jakarta.
- Sims, R. (1985), “Government ownership versus regulation of mining enterprises in less-developed countries”, *Natural Resources Forum*, Vol. 9(4), 265–282.
- Sodhi, N.S. et al. (2010), “The state and conservation of Southeast Asian biodiversity”, *Biodiversity and Conservation*, Vol. 19(2), 317–328.
- Stibig, H.-J. et al. (2007), “Forest cover change in Southeast Asia – the regional pattern”, *JRC Scientific and Technical Research Series*, Office for Official Publications of the European Communities, Luxembourg.
- Stoneham, G. et al. (2012), “Creating physical environmental asset accounts from markets for ecosystem conservation”, *Ecological Economics*, Vol. 82, 114-122.
- Sunderlin, W.D. and H.T. Ba (2005), *Poverty Alleviation and Forests in Vietnam*, Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Suuronen, P. et al. (2013), “Management of trawl fisheries in Southeast Asia and Coral Triangle Region: the REBYC-II CTI Project”, *Fish for the People*, Vol 1(3), 21-24.
- Tang, T. and D. Popp (2014), “The learning process and technological change in wind power: evidence from China’s CDM wind projects”, *NBER Working Paper Series*, No 19921, National Bureau of Economic Research, Cambridge, MA.
- TEEB (2010), *The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations*, Earthscan, London and Washington, DC.
- Uchida, H. (2009), “Community-based management for sustainable fishery: lessons from Japan”, *OECD Workshop Proceedings: Economics of Rebuilding Fisheries*, OECD, Paris.
- USGS (2012), “An estimate of undiscovered oil and gas resources of the world”, *Fact Sheet FS2012-3042*, United States Geological Survey, Boulder.
- USGS (2000), *World Petroleum Assessment*, USGS, Boulder.
- van Beukering, P.J.H., H.S.J. Cesar, and M.A. Janssen (2003), “Economic valuation of the Leuser National Park on Sumatra, Indonesia”, *Ecological Economics*, Vol. 44(1), 43-62.
- Varkey, D.A. et al. (2010), “Illegal, unreported and unregulated fisheries catch in Raja Ampat Regency, Eastern Indonesia”, *Marine Policy*, Vol. 34(2), 228-236.
- Vermeulen, M.S. (2007), *Fair Deals for Watershed Services in Indonesia: Developing markets for watershed services and improved livelihoods*, International Institute

- for Environment and Development, London, available at <http://pubs.iied.org/pdfs/13539IIED.pdf>.
- Vogel, D. (1997a), “Trading up and governing across: transnational governance and environmental protection”, *Journal of European Public Policy*, Vol. 4(4), 556-571.
- Vogel, D. (1997b), “Trading up: consumer and environmental regulation in a global economy”, *Review of International Economics*, Vol. 5(2), 284-293.
- von Essen, L.-M. et al. (2013), “Attitudes and perceptions of villagers toward community-based mariculture in Minahasa, North Sulawesi, Indonesia”, *Ocean and Coastal Management*, Vol. 73, 101-112.
- Voulvoulis, N. et al. (2013), “From chemical risk assessment to environmental resources management: the challenge for mining”, *Environmental Science and Pollution Research*, Vol. 20(11), 7815-7826.
- WAVES (2014), *Waves Annual Report 2014*, available at www.wavespartnership.org/en/publications/waves-publications.
- Wisuttisak, P. (2012), “Liberalization of the Thai energy sector: a consideration of competition law and sectoral regulation”, *J World Energy Law Bus*, Vol. 5(1), 60-77.
- Wood, A.L. et al. (2013), “Sport fisheries: opportunities and challenges for diversifying coastal livelihoods in the pacific”, *Marine Policy*, 42, 305-314.
- World Bank (2012), *Lao PDR, Power to the People: Twenty years of national electrification*, The World Bank Group, Washington, DC.
- World Bank (2011), *The Changing Wealth of Nations*, The World Bank Group, Washington, DC.
- World Bank (2010), *Cambodia Rural Electrification Project*, Project Information Document, The World Bank, Washington, DC, www.worldbank.org/projects/P118935/cambodia-rural-electrification-project?lang=en.
- World Bank (2006), *Where is the Wealth of Nations? Measuring Capital for the 21st Century*, The World Bank, Washington, DC.
- Wu, Y. (2013), “Electricity market integration: global trends and implications for the EAS region”, *Energy Strategy Reviews*, Vol. 2(2), 138-145.
- Wunder, S. (2005), “Payments for environmental services: some nuts and bolts”, *CIFOR Occasional Paper No. 42*, Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Wunder, S., S. Engel and S. Pagiola (2008), “Taking stock: A comparative analysis of payments for environmental service programs in developed and developing countries”, *Ecological Economics*, Vol. 65 pp. 834-852.
- WWF (2014), *Green Growth in the Greater Mekong Subregion*, World Wide Fund for Nature, Gland.

Chapter 4

National policy options for managing the impact of urbanisation on green growth

ASEAN countries are becoming ever more urban – by 2050, 65% of the region's population (over 500 million people) are expected to be living in urban areas. Poorly managed and unsustainable urban development will have many negative economic, environmental and social implications for the region. This chapter focuses on three specific urban challenges with serious implications for national green growth: 1) air pollution from urban transport; 2) vulnerability to climate change; and 3) the growth of informal settlements. It argues that national leadership is needed to make sure urban action is effective and consistent with national green growth objectives. This includes improving national-local policy coherence and building local capacity.

Moving towards green growth in Southeast Asia will require attention to the region's growing cities. Cities represent both a problem and an opportunity for green growth. Depending on how it is managed, urban growth can help or harm efforts to adapt to and mitigate climate change, deliver clean air and water and provide the poorest with access to basic services. A crucial question for national governments interested in pursuing green growth is how to help cities respond to these environmental challenges in a way that sustains local and national growth over the medium to long term, while also delivering benefits to the poor in the short term. When applied to cities in developing countries, the concept of green growth can be understood as de-linking urban population and GDP growth from increases in pollution, resource use and risk from climate-related natural disasters, while aligning growth with urban well-being. Green growth may also present opportunities for cities to stimulate growth through activities that reduce environmental externalities and resource consumption (OECD, 2013a). However, for fast-growing urban areas in Southeast Asia, the first priority should be to grow in ways that are less harmful to the environment and human well-being.

This chapter first presents trends in urbanisation in the ten member countries of the Association of Southeast Asian Nations (ASEAN, also referred to as Southeast Asia in this report), and then makes the case that the cost of unsustainable growth in cities is high, particularly in terms of air pollution, vulnerability to climate change and lack of access to basic services. This is followed by a discussion of policy levers national governments can use to influence and manage urban development so that it contributes to, rather than undermines, green growth. The recommendations focus on national government policy levers, as the aim of this chapter is to address why and how national green growth strategies should take urban activities into account. Urban-level policy makers may also find the recommendations of use, as they point to how national governments can more effectively foster green growth in cities.¹

4.1. Most Southeast Asian countries are urbanising rapidly

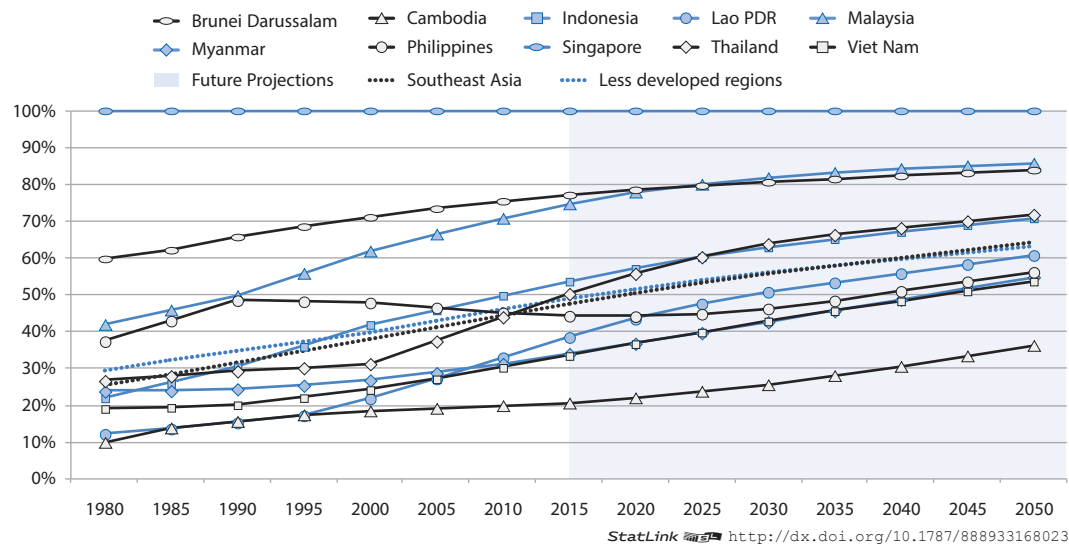
The impact of urban development on national green growth goals is already high in some Southeast Asian countries and will increase across the region as cities grow. Urbanisation rates in ASEAN countries – apart from Singapore and Brunei Darussalam – are still low compared to other regions in the world, but they are growing rapidly (Figure 4.1). In 2010, the share of urban population in Southeast Asian countries was 45% (compared to 46% for less developed regions overall), and by 2050 this share is expected to grow to 65%, surpassing the average for less-developed regions worldwide (63%) (UN DESA, 2014a). The region is likely to add over 100 million new urban residents between 2010 and 2025, and by 2050 the urban population will reach over 500 million, close to double the 266 million in 2010 (UN DESA, 2014b). There are large variations between countries: in 2010 the highest urbanisation rates were in Singapore (100%), Brunei Darussalam (76%) and Malaysia (71%), while only 20% of Cambodia's population was urbanised. Several low and middle-income countries are clustered around a 30% urbanisation rate: Viet Nam (30%), Myanmar (31%) and Lao People's Democratic Republic (hereafter "Lao PDR") (33%), while Thailand (44%), the Philippines (49%) and Indonesia (50%) are close to the regional average (UN DESA, 2014a).

The low overall urbanisation rate in some Southeast Asian countries can understate the importance of cities. For example, while urbanisation rates are relatively low in Viet Nam and Thailand, roughly 25% or more of the population resides in cities of over 5 million people (Figure 4.2) (UN DESA, 2012a). Indonesia is home to the greatest cluster

of cities: in addition to Jakarta, it has six cities of between 1-5 million people and 11 cities of between 0.5-1 million people (Figure 4.3) (UN DESA, 2012b). These data may even underestimate city sizes, as they are based on administrative boundaries rather than the actual size of urban agglomerations. For example, one estimate of the world's largest urban agglomerations, based on labour markets and related criteria, puts the population of greater Jakarta at 27 million people in 2014 (compared to the UN 2015 projection of 10.5 million people for the province of Jakarta), greater Manila at 22.5 million people (compared to

Figure 4.1. **All Southeast Asian countries are urbanising, but at different rates**

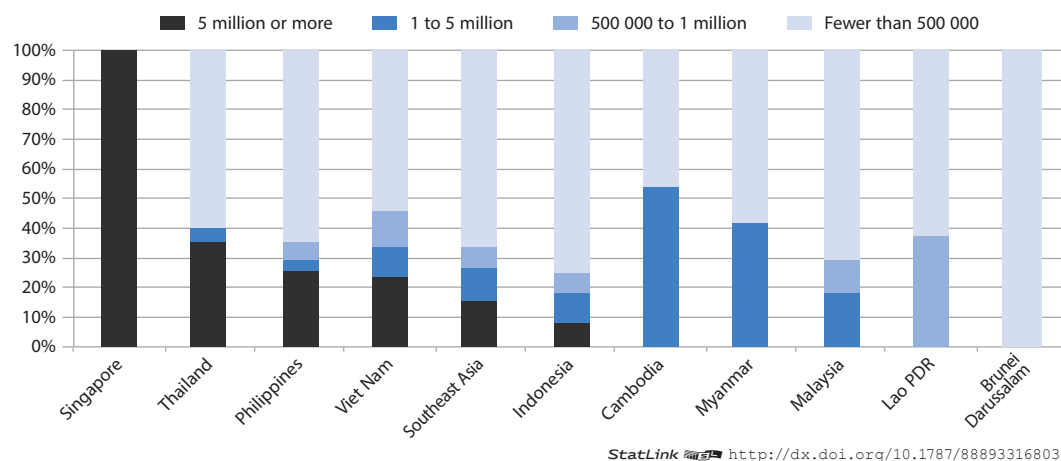
Share of population at mid-year residing in urban areas, 1980-2050



Note: Shaded area indicates projections from 2015-2050.

Source: Author's calculations based on UN DESA (2014a) "File 2: Percentage of Population at Mid-Year Residing in Urban Areas by Major Area, Region and Country, 1950-2050", *World Urbanization Prospects: The 2014 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

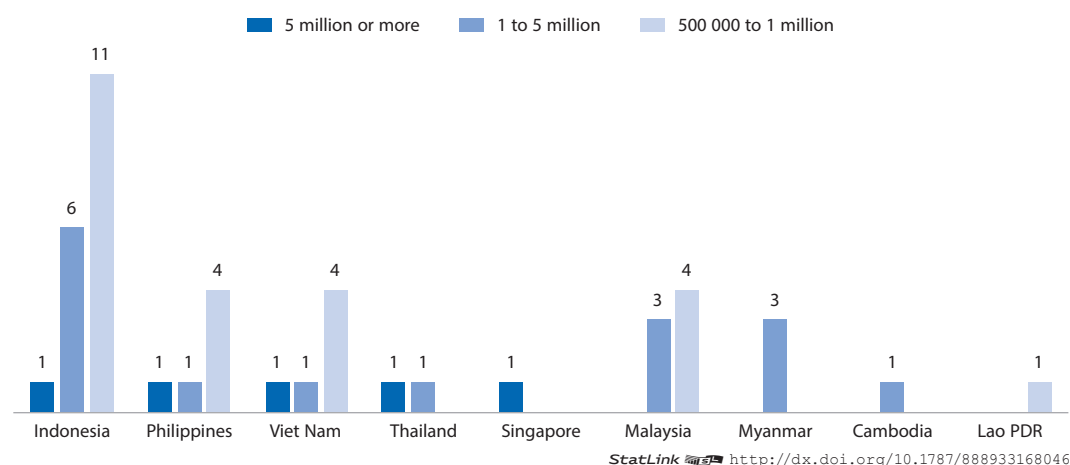
Figure 4.2. **Share of urban population by city size in Southeast Asia**
2010



Source: Author's calculations based on UN DESA (2012a), "File 17c: Percentage of Urban Population in Cities Classified by Size Class of Urban Settlement, Major Area, Region and Country, 1950-2025", *World Urbanization Prospects: The 2011 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

compared to the UN 2015 projection of 12.9 million people for the city of Manila), greater Bangkok at 14.9 million (rather than 9.3 million in UN 2015 projections) and greater Ho Chi Minh City at 8.1 million (compared to 7.3 million people in UN 2015 projections) (Brinkhoff, 2014; UN DESA, 2012c).

Figure 4.3. Number of cities classified by city size
2010



Note: Data for Brunei Darussalam not available.

Source: Author's calculations based on UN DESA (2012b), "File 17b: Number of Cities Classified by Size Class of Urban Settlement, Major Area, Region and Country, 1950-2025", *World Urbanization Prospects: The 2011 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

This chapter separates countries in Southeast Asia into three categories: (1) urban nations (Brunei Darussalam, Singapore); (2) nations with large cities or a high rate of urbanisation (Indonesia, Malaysia, Philippines, Thailand, Viet Nam); and (3) nations with a low rate of urbanisation and few large cities (Cambodia, Lao PDR and Myanmar) (Table 4.1). In the first and second categories, the very high rates of urbanisation already justify including urban activities in national green growth plans and targets. However, even in countries with lower rates of urbanisation or few large cities, urban activities will have an increasing impact on overall environmental performance. This means that the policy mechanisms in place now, and the patterns of urban development and infrastructure investment over the coming years, will have a large impact on these countries' opportunities to pursue green growth.

Table 4.1. Southeast Asian countries fall into three urban groups

Urban nations	High urbanisation or large cities	Low urbanisation, few large cities
Brunei Darussalam	Indonesia	Cambodia
Singapore	Malaysia	Lao PDR
	Philippines	Myanmar
	Thailand	
	Viet Nam	

4.2. The costs of unsustainable urban development are high

Unsustainable urban development will have many negative impacts on national economic, environmental and social outcomes in Southeast Asian countries. This section focuses on three specific challenges with serious implications for national performance:

1. air pollution from urban transport
2. vulnerability to climate change
3. the growth of informal settlements that lack access to water and wastewater sanitation services.

Rapid urbanisation has many other environmental impacts, including growing rates of solid waste generation, industrial pollution, and urban ecosystem degradation. The above three challenges, however, are particularly pertinent, while also offering some feasible policy solutions. To understand the economic and social costs of these urban environmental challenges, it is necessary to understand how cities in the region are expanding. These patterns of urban expansion are discussed next.

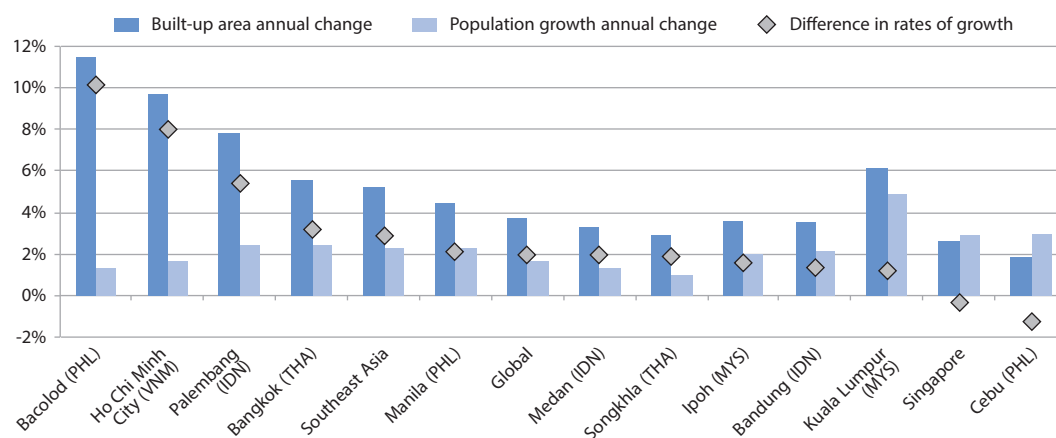
Unmanaged urban expansion threatens sustainability

To understand the economic and social costs associated with urban environmental challenges in Southeast Asia, it is necessary to understand how cities in the region are expanding. Urban spatial growth patterns are not the only contributor to the environmental impact of urbanisation, which also include a trend towards higher rates of resource consumption, particularly energy, and concentrations of industrial activity. However, it is worthwhile focusing on urban expansion patterns as they affect both the degree of environmental impact – in the form of air pollution, climate vulnerability, and inadequate water quality and sanitation services – and the degree to which these trends can be reversed. Rapid, unmanaged development on the urban fringe can lock in infrastructure and development patterns that will be costly to reverse.

In response to the impacts of urban expansion, some local and national policy makers, particularly in OECD countries, have advocated more compact forms of development, which favours denser residential development and urban infill so as to discourage urban sprawl (OECD, 2012a).² However, for those cities in developing countries that are growing rapidly, the notion of compact development must allow room for some urban expansion. This calls for urban expansion that is well managed and focused on connecting new urban developments to transport, water, sanitation and other necessary infrastructure (Angel, 2012).

Cities in the ASEAN region are tending to expand with minimal public planning through spatially-segregated, low-density developments on the urban fringe. Urban areas' physical expansion tends to outpace their population growth (Figure 4.4), though this may be necessary in some cities to correct historically high densities. Nonetheless, since the 1990s, the suburban population of Jakarta has been greater than that in the city core, which grew at a much lower rate. Developments in Jakarta's suburbs tend to be characterised by low-density developments in communities that are gated or otherwise characterised by restricted access (Hudalah and Firman, 2012). This can limit options for public transport services and encourage the use of personal vehicles. In Kuala Lumpur, the core urban areas have experienced strong growth (77% between 1980 and 2010), but suburban areas are still growing more quickly (280% over the same period), and are also characterised by low-density, car-based communities (Cox, 2013). While Kuala Lumpur's inner city is quite dense (6 700 people/km²), the suburban areas are very spread out, similar to the suburbs of Los Angeles in the United States (2 600 people/km²) (Cox, 2013).

Figure 4.4. Urban expansion in Southeast Asian cities tends to outpace population growth
 Cities ranked by difference in built-up area growth rate compared to their population growth rate, 1989-2002



StatLink <http://dx.doi.org/10.1787/888933168051>

Notes: (IDN) Indonesia, (MYS) Malaysia, (PHL) Philippines, (THA) Thailand, (VNM) Viet Nam.

Start dates range from 1989-1994; end dates range from 1999-2002.

Source: Author's calculations based on Angel, S., J. Parent, D.L. Civco and A.M. Blei (2010), *Atlas of Urban Expansion*, Lincoln Institute of Land Policy, Cambridge, MA, available at www.lincolninstitute.edu/subcenters/atlas-urban-expansion/, last accessed 9 May 2014.

Urban development visions and plans tend not to have a strong impact on actual urban development patterns in many Southeast Asian countries, making it difficult for the public sector to align urban form with environmental or economic goals. In many cities, the public sector has limited influence over land development decisions, being driven instead by the priorities of private sector developers (McGee, 2005; Percival and Waley, 2012; Porio, 2009). In the Jakarta Metropolitan Area, for example, some private developers manage urban development in the place of municipal authorities, and private neighbourhoods provide urban amenities and services that in OECD countries are more likely to be provided by municipal governments (Firman, 2004b; Zhu, 2010). In Indonesia, land permits are easily obtained by private developers even when the developments conflict with existing urban plans (Firman, 2009). This can result in “leapfrog” development, where urban land “leaps” over undeveloped land. Development and building permits tend to be used as revenue-raising tools rather than mechanisms for managing land use (Firman, 2004a). In Hanoi, the lack of strategic urban planning has contributed to the location of industrial zones in the rural fringe of the city and irregular expansion of housing development into suburban villages (Quang and Kammeier, 2002).

Unmanaged, unstructured urban expansion can result in areas that are poorly served by infrastructure. In richer neighbourhoods, this can take the form of infrequent public transport service, while in poorer areas this is more likely to take the form of inadequate access to drinking water and sanitation facilities. A lack of transport connecting poorer and richer areas can also reduce the size of the local labour market by making it difficult for low-income residents to travel to jobs located in high-income areas (OECD, 2014b).

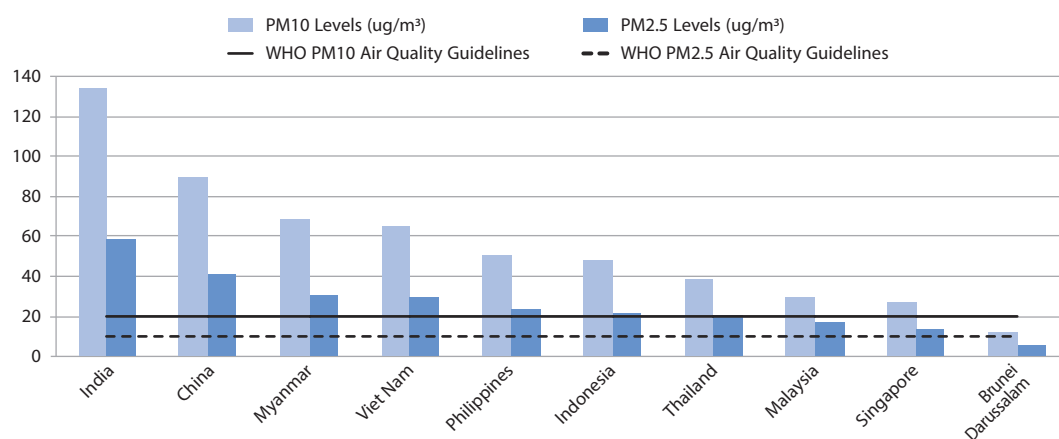
Air pollution imposes high costs on cities in Southeast Asia

Poorly managed urbanisation can result in increased levels of air pollution, which has long-term impacts on human health and economic growth. Rapid urban expansion contributes to air pollution when it outpaces investment in public transport infrastructure and creates areas that are costly to serve through public transport. Increases in air pollution are also related to a trend throughout the region towards greater use and ownership of private vehicles.

While urban air pollution rates in ASEAN are lower than in the People's Republic of China and India, in all countries but Brunei Darussalam the levels of particulate matter less than 10 microns of diameter (PM₁₀) and less than 2.5 microns of diameter (PM_{2.5}) are still higher than World Health Organization (WHO) guidelines (Figure 4.5 and see Chapter 1). Particulate matter contributes to premature death from cardiovascular disease and lung cancer, among other diseases, and PM_{2.5} is of particular concern as these smaller particles are able to reach deep into human lungs (OECD, 2012b). PM₁₀ and PM_{2.5} levels in the largest cities in the region are generally on a par with their national averages for urban areas, thus exceeding WHO standards (Figure 4.6).

Figure 4.5. Air pollution levels exceed WHO standards in most cities

Annual mean concentration (micrograms/m³) of urban PM₁₀ and PM_{2.5} levels in ASEAN, China and India, 2009-2012



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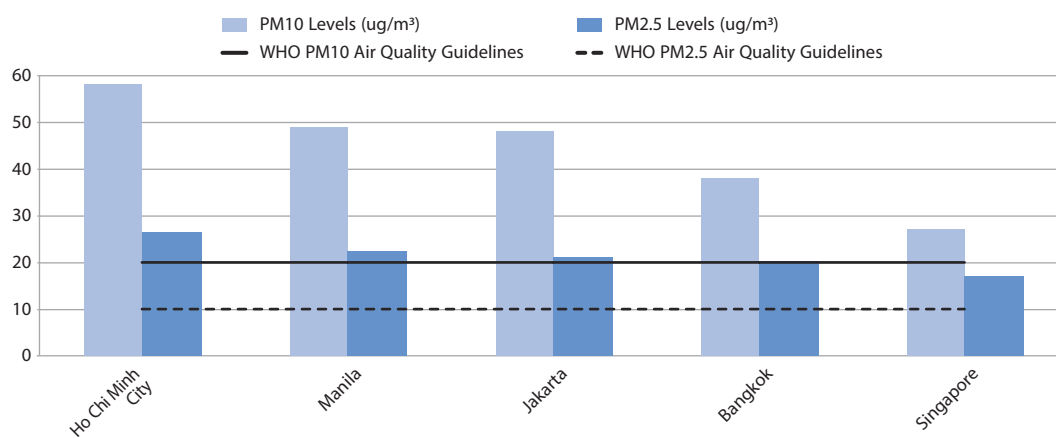
Notes: Data not available for Cambodia and Lao PDR.

PM₁₀ is particulate matter of less than 10 microns of diameter and PM_{2.5} is particulate matter of less than 2.5 microns of diameter.

Source: Author's calculations based on Ambient Air Pollution Database, WHO (World Health Organization), May 2014, available at www.who.int/phe/health_topics/outdoorair/databases/cities/en/, last accessed 13 May 2014.

Air pollution has long-term and wide-ranging health and economic impacts. For example, it can have measurable effects on earnings potential, primarily in terms of a decrease in labour force participation. One study found that high air pollution levels in the year of a person's birth affect their earnings nearly 30 years later (Isen et al., 2014). This was based on an analysis of counties in the United States whose air pollution levels significantly declined after enactment of the US Clean Air Act of 1970: children born one to three years before the act took effect had lower earnings as 29-30 year-olds than children born one to two years after the act took effect (Isen et al., 2014).

Figure 4.6. **Pollution levels in the region's largest cities**
Annual mean concentration (micrograms/m³) of PM₁₀ and PM_{2.5}, cities over 5 million inhabitants, 2009-2012



StatLink <http://dx.doi.org/10.1787/888933168072>

Note: PM₁₀ is particulate matter of less than 10 microns of diameter and PM_{2.5} is particulate matter of less than 2.5 microns of diameter.

Sources: Author's calculations based on Ambient Air Pollution Database, WHO (World Health Organization), May 2014, available at www.who.int/phe/health_topics/outdoorair/databases/cities/en/, last accessed 13 May 2014; UN DESA (2012c), "File 12: Population of Urban Agglomerations with 750,000 Inhabitants or More in 2011, by Country, 1950-2025", World Urbanization Prospects: The 2011 Revision, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

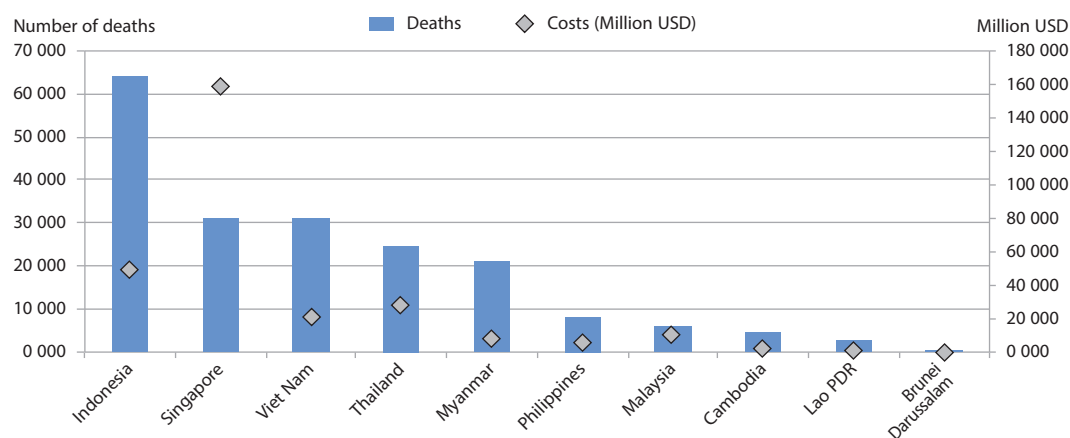
Estimates of the overall cost of air pollution to local and national economies are often based on costs associated with premature death and willingness to pay to reduce the risk of premature death (Kan and Chen, 2004; Quah and Boon, 2003; Resosudarmo and Napitupulu, 2004). The OECD has developed a methodology to estimate the costs of air pollution in individual countries, based on calculations of the value of a statistical life derived from a meta-analysis of surveys of individuals' willingness to pay and linked to national GDP levels (OECD, 2014c; OECD, 2012c). Here we use the OECD methodology to analyse WHO data on deaths from outdoor pollution. This reveals that in 2010 the costs of outdoor air pollution (from all sources) was nearly USD 50 billion in Indonesia, over USD 27 billion in Thailand and over USD 20 billion in Viet Nam (Figure 4.7). While these costs correlate in part with levels of national GDP, it is worth noting that the share of the urban population who died from causes related to air pollution tended to be highest in countries with the lowest rates of urbanisation – Cambodia, Myanmar, Lao PDR and Viet Nam, perhaps because reducing urban air pollution could be a lower priority in countries where fewer people live in cities. The exception is Singapore, whose higher share of urban deaths from air pollution may be explained in part by the fact that its entire population is urban (Table 4.2) (Institute for Health Metrics and Evaluation, 2013; UN DESA 2014b).

Air pollution is related in part to rates of car ownership, which have been rising across Southeast Asia (Figure 4.8). Malaysia has the highest rate of vehicles as a share of the population, which reached 693 vehicles per 1 000 people in 2010 (Clean Air Asia, 2014). The rates of growth in the share of vehicles between 2001 and 2010, however, were generally inversely related to urbanisation rates in 2010, with the share of vehicles quadrupling in Lao PDR, tripling in Viet Nam and doubling in Indonesia (Figure 4.9).

Southeast Asian cities are increasingly vulnerable to climate change impacts

Poorly managed urban expansion can increase cities' vulnerability to climate change, which in turn can undermine national economic performance, particularly when cities play an important role in the national economy. Adaptation to climate change contributes to green growth by improving human well-being and protecting the natural and economic assets that

Figure 4.7. **Air pollution costs are high in the region**
Deaths from outdoor pollution and associated costs, 2010



StatLink <http://dx.doi.org/10.1787/888933168087>

Note: Pollution includes ambient PM₁₀ pollution and ambient ozone pollution; costs based on the value of a statistical life using methodology from OECD (2014), *The Cost of Air Pollution: Health Impacts of Road Transport*, OECD Publishing, <http://dx.doi.org/10.1787/9789264210448-en>.

Sources: Author's calculations based on data extracted from Institute for Health Metrics and Evaluation (2013), The Global Burden of Disease (GBD) Visualizations: GBD compare. Institute for Health Metrics and Evaluation, Seattle. <http://viz.healthmetricsandevaluation.org/gbd-compare/>, last accessed 17 June 2014.

Table 4.2. **Deaths from air pollution as share of urban population**
2010

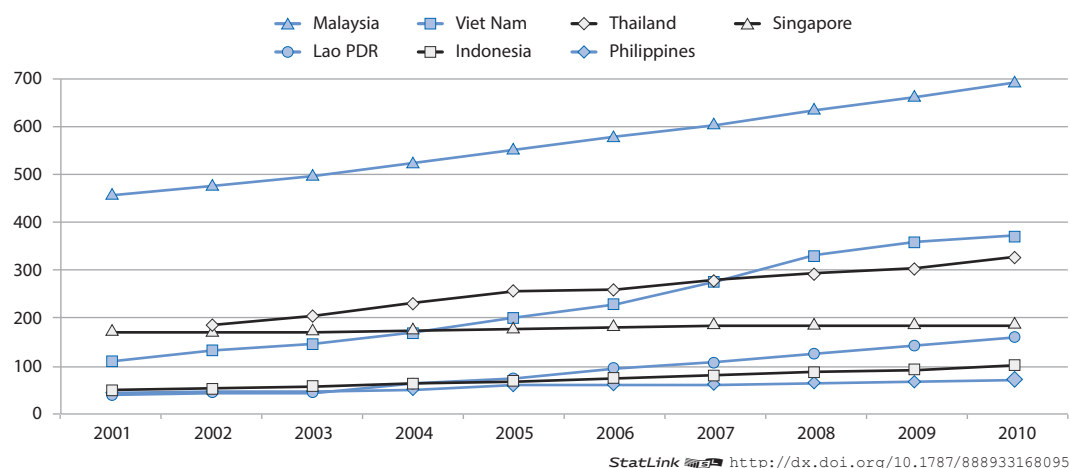
Country	Number of deaths from PM ₁₀ and ozone combined (WHO data)	Deaths as share of national urban population	Share of national population living in urban areas, 2010
Singapore	30 959	0.61%	100.0%
Cambodia	4 518	0.16%	19.8%
Myanmar	20 777	0.13%	31.4%
Lao PDR	2 470	0.13%	33.1%
Viet Nam	30 959	0.11%	30.4%
Thailand	24 590	0.08%	44.1%
Indonesia	64 182	0.05%	49.9%
Malaysia	5 956	0.03%	70.9%
Philippines	8 283	0.02%	45.3%
Brunei Darussalam	13	0.004%	75.5%

StatLink <http://dx.doi.org/10.1787/888933168313>

Sources: Author's calculations based on data extracted from Institute for Health Metrics and Evaluation (2013), The Global Burden of Disease (GBD) Visualizations: GBD compare. Institute for Health Metrics and Evaluation, Seattle. <http://viz.healthmetricsandevaluation.org/gbd-compare/>; UN DESA (2014a) "File 2: Percentage of Population at Mid-Year Residing in Urban Areas by Major Area, Region and Country, 1950-2050", World Urbanization Prospects: The 2014 Revision, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York; UN DESA (2014b) "File 3: Urban Population at Mid-Year by Major Area, Region and Country, 1950-2050", World Urbanization Prospects: The 2014 Revision, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

are necessary for growth over the long-term in an urban context (e.g. forests, mangroves). Because adaptation reduces vulnerability, it has the potential to improve the lives of the poorest as they tend to be most hard-hit by disasters; thus, green growth strategies that include cities' adaptation to climate change can contribute to poverty reduction and social equity (OECD, 2013b). Urban areas deserve attention in national adaptation and disaster risk reduction efforts, as they are likely to be particularly vulnerable to flooding due to their

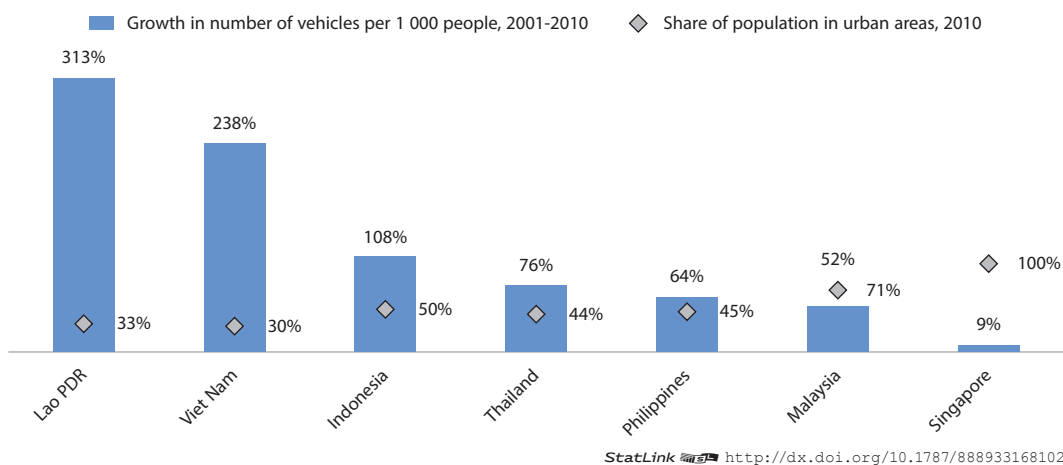
Figure 4.8. Car ownership is rising in Southeast Asia
Total number of vehicles per thousand people, 2001-2010



Note: Data for Brunei Darussalam, Cambodia and Myanmar not available. Data for Thailand are for 2002-10.

Source: Author's calculations based on Clean Air Asia (2014) "Motorization Index (Total)", Transport Indicators, CitiesACT database, Clean Air Asia, Philippines, available at <http://citiesact.org/data/search/transport-indicators>, accessed 15 May 2014.

Figure 4.9. Car ownership is rising fastest in countries with the smallest share of urban dwellers
Growth in number of vehicles per 1 000 people and urbanisation rates



Note: Data for Brunei Darussalam, Cambodia and Myanmar not available. Data for Thailand are for 2002-10.

Sources: Author's calculations based on Clean Air Asia (2014) "Motorization Index (Total)", Transport Indicators, CitiesACT database, Clean Air Asia, Philippines, available at <http://citiesact.org/data/search/transport-indicators>, accessed 15 May 2014; UN DESA (2014a) "File 2: Percentage of Population at Mid-Year Residing in Urban Areas by Major Area, Region and Country, 1950-2050", World Urbanization Prospects: The 2014 Revision, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

tendency to be located near coasts and waterways, to experience higher temperatures than surrounding rural areas, and to house concentrations of low-income populations, many in informal settlements that tend to be located in hazardous zones, such as floodplains and other low-lying areas (OECD, 2010).

Cities in Southeast Asia are already more vulnerable to flooding than those in other regions. While 34% of cities with over 750 000 inhabitants worldwide are at high risk of flooding, 63% of those in Southeast Asia are at high risk (UN DESA, 2012d). In the region, Indonesia is home to the greatest number of cities at high-risk of climate-related flooding, while three cities in the Philippines are at high risk for both climate-related flooding and cyclones (Table 4.3). Viet Nam is also home to cities at risk of floods and/or cyclones.

Table 4.3. **Southeast Asian cities at high risk for climate-related natural disasters**
Urban agglomerations with 750 000 inhabitants or more in 2011 cities in top three deciles in 2011

Country	Flood	Cyclone	Drought
Cambodia	Phnom Penh		
Indonesia	Bandung Batam Bogor Jakarta Malang Medan Pekan Baru Semarang Surabaya		
Lao PR	Vientiane	Vientiane	
Malaysia	Johore Bahru Klang Kuala Lumpur		
Myanmar			Mandalay Nay Pyi Taw Yangong
Philippines	Cebu Davao Manila	Cebu Davao Manila	
Singapore	Singapore		
Viet Nam	Can Tho Da Nang Hà Nội Ho Chi Minh City	Da Nang Hai Phòng	

Note: An area is classified as being at “high risk” of a particular natural disaster if it is located in grid cells ranking in the top three deciles of the global risk distribution in terms of frequency of occurrences of one or more specified natural hazards. No cities over 750 000 inhabitants in Thailand or Brunei Darussalam were in the top three deciles.

Source: Adapted from UN DESA (United Nations, Department of Economic and Social Affairs) (2012d), *World Urbanization Prospects: The 2011 Revision*, File 23: Coastal status, Type of drylands ecosystem, Number of multi-Hazards, Risk decile by type of hazard for Urban Agglomerations with 750,000 Inhabitants or More in 2011, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York; based on data from *Natural Disaster Hotspots: A Global Risk Analysis* (Dilley et al., 2005) produced by the Center for Hazards and Risk Research (CHRR); Center for International Earth Science Information Network (CIESIN), Columbia University; International Bank for Reconstruction and Development / The World Bank (www.ldeo.columbia.edu/chrr/research/hotspots).


While few cities in the region are at high risk of drought, it is worth noting that the three cities that are at risk are all located in Myanmar.

In 12 global port cities in Southeast Asia in 2005, a total of over 5 million people were located in areas at risk of a 100-year flood event (Table 4.4). Five of these cities rank among the top 25 global port cities (out of 136 cities studied) in terms of population currently exposed to flooding (Hanson et al., 2011; Hallegatte et al., 2013b). Six of the region's cities are expected to rank among the top 25 globally by 2050 under a scenario involving socio-economic change, subsidence, sea level rise of 20cm and adaptation measures that maintain 2005 flood defences and constant flood probability. Scenarios that do not take into account adaptation to climate change are not realistic, because the projected losses would greatly exceed what populations and economies can absorb (Hallegatte et al., 2013a).

While the number of people exposed to flooding is projected to decrease when flooding defences are taken into account, the economic loss due to flooding is nonetheless expected to greatly increase over 2005-50, due mainly to a projected increase in wealth. Under a 2050 scenario,³ average annual losses due to coastal flooding in Southeast Asia are expected to reach USD 6 billion in 2050, up from roughly USD 300 million in 2005 (Table 4.5) (Hallegatte et al., 2013a; Hallegatte et al., 2013b). In this study, three Southeast Asian cities figure in the top 20 coastal cities for flood risk in 2005: Ho Chi Minh City, Jakarta and Bangkok. Palembang, Indonesia joins the top 25 under the 2050 scenario.

Table 4.4. Number of people in Southeast Asian port cities exposed to a 100-year flood event, 2005 and in a 2050 scenario

Urban agglomeration	2005		2050 scenario	
	Population exposed to a 100-year flood event, 2005 with maximum estimated protection	Rank among 136 global port cities – exposed population, 2005	Population exposed to a 100-year flood event, 2050 with maximum estimated protection	Rank among 136 global port cities – exposed population, 2050
Ho Chi Minh City	1 931 028	5	0	133
Bangkok	906 519	13	95 951	11
Hai Phòng	793 927	16	48 257	16
Jakarta	513 185	21	114 618	7
Rangoon	510 417	22	166 673	6
Kuala Lumpur	269 897	35	9 571	45
Palembang	126 697	48	40 889	20
Manila	112 641	53	33 400	23
Surabaya	52 767	68	12 109	41
Singapore	16 266	96	28	131
Ujung Pandang	6 852	118	2 486	69
Davao	2 546	130	1 104	85
Total	5 242 743		525 086	

StatLink  <http://dx.doi.org/10.1787/888933168322>

Note: Shaded areas indicate top 25 of 136 global port cities studied. 2050 scenario is characterised by socio-economic change, subsidence, sea level rise of 20cm by 2050 and adaptation measures that maintain 2005 flood defences and constant flood probability. Maximum protection refers to the higher bound of estimates for current flood protection, which is assumed to be maintained over 2050.

Sources: Adapted from Hallegatte, S., C. Green, R. Nicholls and J. Corfee-Morlot (2013b), “Future flood losses in major coastal cities: Supplementary information”, *Nature Climate Change*, vol. 3, pp 802-806; Hanson, S. et al. (2011), “A global ranking of port cities with high exposure to climate extremes”, *Climatic Change*, vol. 104, pp. 89-111.


Jakarta is expected to experience the greatest increase in average annual losses in the region between 2005 and 2050 (54%), ranking it among the top 10 global port cities in terms of increased risk (Hallegatte et al., 2013b). Five Southeast Asian Cities rank among the top 25 for relative risk (losses as a share of GDP in 2050): Ho Chi Minh City, Palembang, Hai Phòng, Jakarta and Rangoon. This measure is important as it points to the toll that coastal flooding could take on the local economy (Hallegatte et al., 2013a).

Ho Chi Minh City, Jakarta and Bangkok are also at risk of significant land subsidence, which influences local sea level and exacerbates flood risk in 2050 (Hallegatte et al., 2013a). In the case of Bangkok, land subsidence is a bigger contributor to urban flooding than climate change risks, and is expected to account for nearly 70% of the increase in flooding damage costs between 2008 and 2050 (World Bank, 2010). Subsidence is usually caused by the unsustainable use of local groundwater resources, emphasising the need to take a systemic view of all environmental challenges in order to fully manage risk. Settlements in delta areas, a common feature in Southeast Asia, are particularly vulnerable to subsidence, as the natural subsidence that occurs in deltas is exacerbated by water extraction and diversion, and the use of dams (Jha et al., 2012).

Overall, these data point to the high vulnerability of Southeast Asian coastal cities to climate-related flooding. The increase in asset values brought about by urban growth and rising incomes means that even with adaptation measures that maintain 2005 flood

Table 4.5. **Absolute and relative annual losses due to coastal flooding in 2005 and in a 2050 scenario**
Southeast Asian port cities

Urban agglomeration	2005		2050 scenario with a 20 cm sea level rise and subsidence and adaptation measures that maintain flood frequency at 2005 levels			
	Mean annual loss (Million USD) with maximum estimated protection	Rank out of 136 port cities (average annual losses 2005)	Mean annual loss (Million USD)	Rank out of 136 port cities (average annual losses 2050)	Mean annual loss (% city GDP)	Rank out of 136 port cities (average annual losses per GDP 2050)
Thành-Pho-Ho-Chí-Minh (Ho Chi Minh City)	104	13	1 953	9	0.83%	5
Jakarta	73	20	1 750	11	0.22%	23
Krung_Thep (Bangkok)	42	24	734	18	0.09%	37
Palembang	27	36	506	21	0.48%	9
Manila	23	39	329	30	0.06%	48
Hai Phòng	19	41	383	27	0.44%	10
Rangoon	10	48	202	40	0.21%	24
Kuala Lumpur	5	66	63	62	0.04%	60
Surabaya	5	67	110	52	0.06%	47
Ujung Pandang	1	112	12	92	0.02%	73
Davao	0.50	119	6	110	0.01%	87
Singapore	0.26	127	2	127	0.00%	135
Total	309		6 050			

StatLink  <http://dx.doi.org/10.1787/888933168332>

Note: Shaded areas indicate top 25 of 136 global port cities studied. 2050 scenario is characterised by socio-economic change, subsidence, sea level rise of 20cm by 2050 and adaptation measures that maintain 2005 flood defences and constant flood probability. Maximum protection refers to the higher bound of estimates for current flood protection, which is assumed to be maintained over 2050.

Sources: Adapted from Hallegatte, S., C. Green, R. Nicholls and J. Corfee-Morlot (2013a), “Future flood losses in major coastal cities,” *Nature Climate Change*, vol.3, pp. 802-806; Hallegatte, S., C. Green, R. Nicholls and J. Corfee-Morlot (2013b), “Future flood losses in major coastal cities: Supplementary information” *Nature Climate Change*.

probability, annual losses will increase in absolute terms – and, very probably, relative to local GDP – unless even greater steps are taken to reduce the likelihood of flooding over time (Hallegatte et al., 2013a).

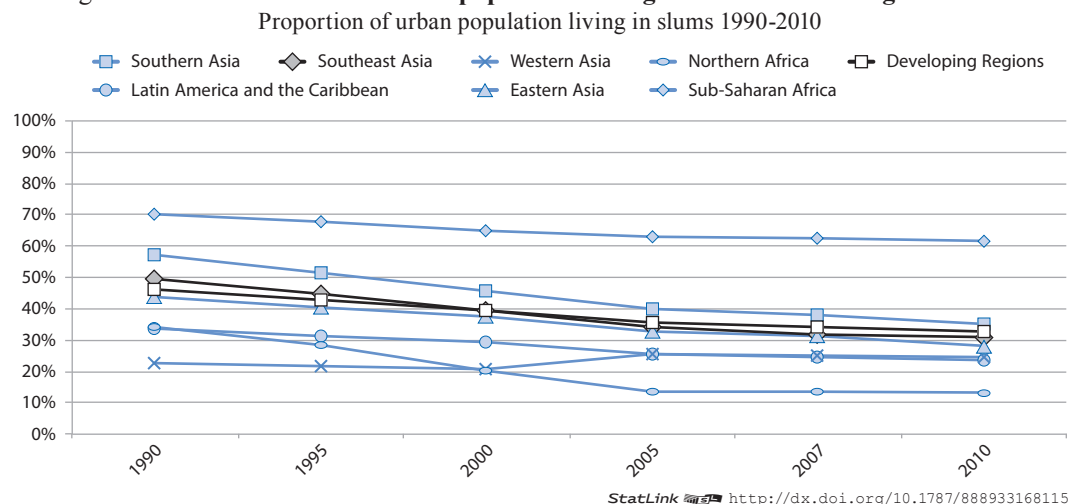
Poorly serviced areas, including slums, increase cities' vulnerability

Another consequence of unmanaged urban expansion is the growth of informal settlements, such as slums. These often lack access to adequate water and sanitation and can hold back long-term economic growth and environmental quality of life. UN-Habitat (2010a) defines slums as dwellings that lack access to one or more of five amenities (i.e. a permanent structure that protects from extreme climate conditions, no more than three people sharing a room, access to improved water, access to improved sanitation, and secure tenure). Because data on secure tenure are rare, only the first four conditions are used to measure the share of people living in slums (UN-Habitat, 2010a).

According to UN-Habitat, the share of urban slum dwellers in Southeast Asia's urban areas has declined considerably – from 50% in 1990 to 31% in 2010 – slightly above the average decline in developing regions as a whole (Figure 4.10) (UN-Habitat, 2010b). Within the region, there is wide variation in the percentage of urban dwellers living in slums. Lao PDR and Cambodia, which have the lowest overall urbanisation rates, have the highest share of urban population living in slums (Figure 4.11)

While UN-Habitat defines slums based on five criteria, this section will focus on the two criteria that most directly relate to environmental performance: access to improved water and sanitation. Access to these two services in urban areas across Southeast Asia has improved since 1990, with the share of the urban population with access to improved drinking water sources increasing from 90% to 95% from 1990-2012, and access improved sanitation growing from 69% to 80% in the same period. Access to improved sanitation in Southeast Asia in 2012 was greater than in Eastern Asia (76%), Oceania (76%), Southern Asia (64%) and Sub-Saharan Africa (41%) (WHO and UNICEF, 2014).

Figure 4.10. The share of the urban population living in slums is declining worldwide

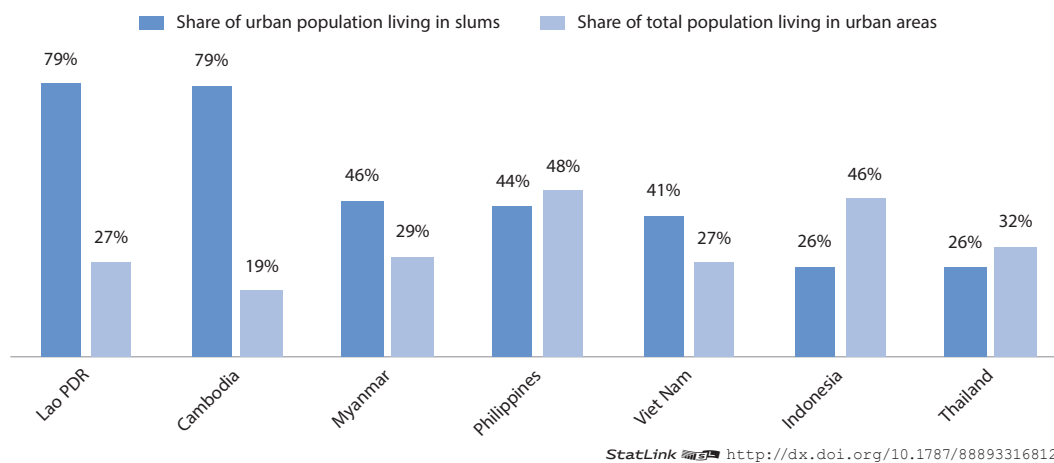


Note: Slum dwellers defined as people living in household that lack either improved water, improved sanitation, sufficient living area (more than three persons per room), or durable housing. Trends data are not available for Oceania.

Source: Author's calculations based on UN-Habitat (United Nations Human Settlements Programme) (2010b), *The State of Asian Cities 2010/2011*, UN-Habitat, Fukuoka, Japan.

Figure 4.11. **Southeast Asian cities vary in the prevalence of slums**

Share of urban slum population and urban share of population, 2005



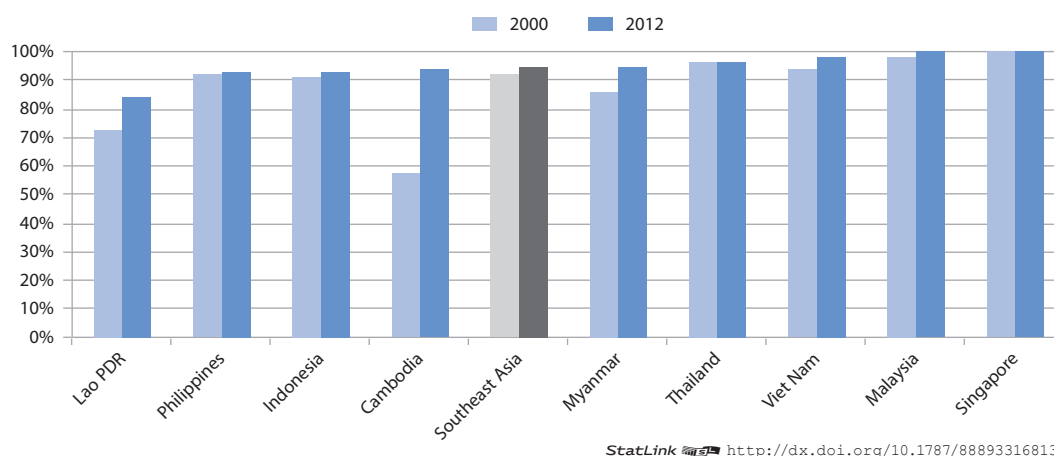
Note: Data not available for Brunei Darussalam, Malaysia and Singapore.

Sources: Author's calculations based on UN-Habitat (2010b), *The State of Asian Cities 2010/2011*, UN-Habitat, Fukuoka, Japan; UN DESA (United Nations, Department of Economic and Social Affairs) (2012), *World Urbanization Prospects: The 2011 Revision*, File 2: Percentage of Population Residing in Urban Areas by Major Area, Region and Country, 1950-2050, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

The proportion of urban dwellers with access to improved water and sanitation varies greatly across the region (Figures 4.12 and 4.13), though all countries improved access between 2000 and 2012. Relatively lower rates of access to sanitation still exist: less than 80% of the urban populations of Indonesia (71%) and the Philippines (79%) had access to improved sanitation in 2012, though this is still an improvement over 2000 access rates of 66% and 74% respectively (WHO and UNICEF, 2014).

Figure 4.12. **Use of improved water drinking sources within Southeast Asia**

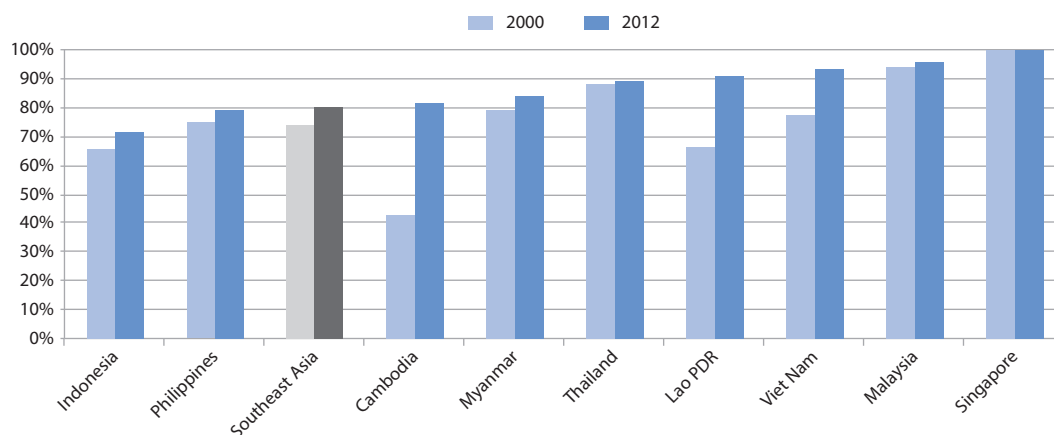
Percentage of the urban population, 2000 and 2012



Note: Data not available for Brunei Darussalam.

Source: Author's calculations based on WHO and UNICEF (World Health Organization and United Nations) (2014), *Progress on Drinking-Water and Sanitation: 2014 Update Tables*, WHO/UNICEF, available at <http://www.wssinfo.org/data-estimates/tables>, last accessed May 2014.

Figure 4.13. **Use of improved sanitation facilities within Southeast Asia**
Percentage of the urban population, 2000 and 2012



StatLink <http://dx.doi.org/10.1787/888933168148>

Source: Author's calculations based on WHO and UNICEF (World Health Organization and United Nations) (2014), *Progress on Drinking-Water and Sanitation: 2014 Update Tables*, WHO/UNICEF, available at <http://www.wssinfo.org/data-estimates/tables>, last accessed May 2014.

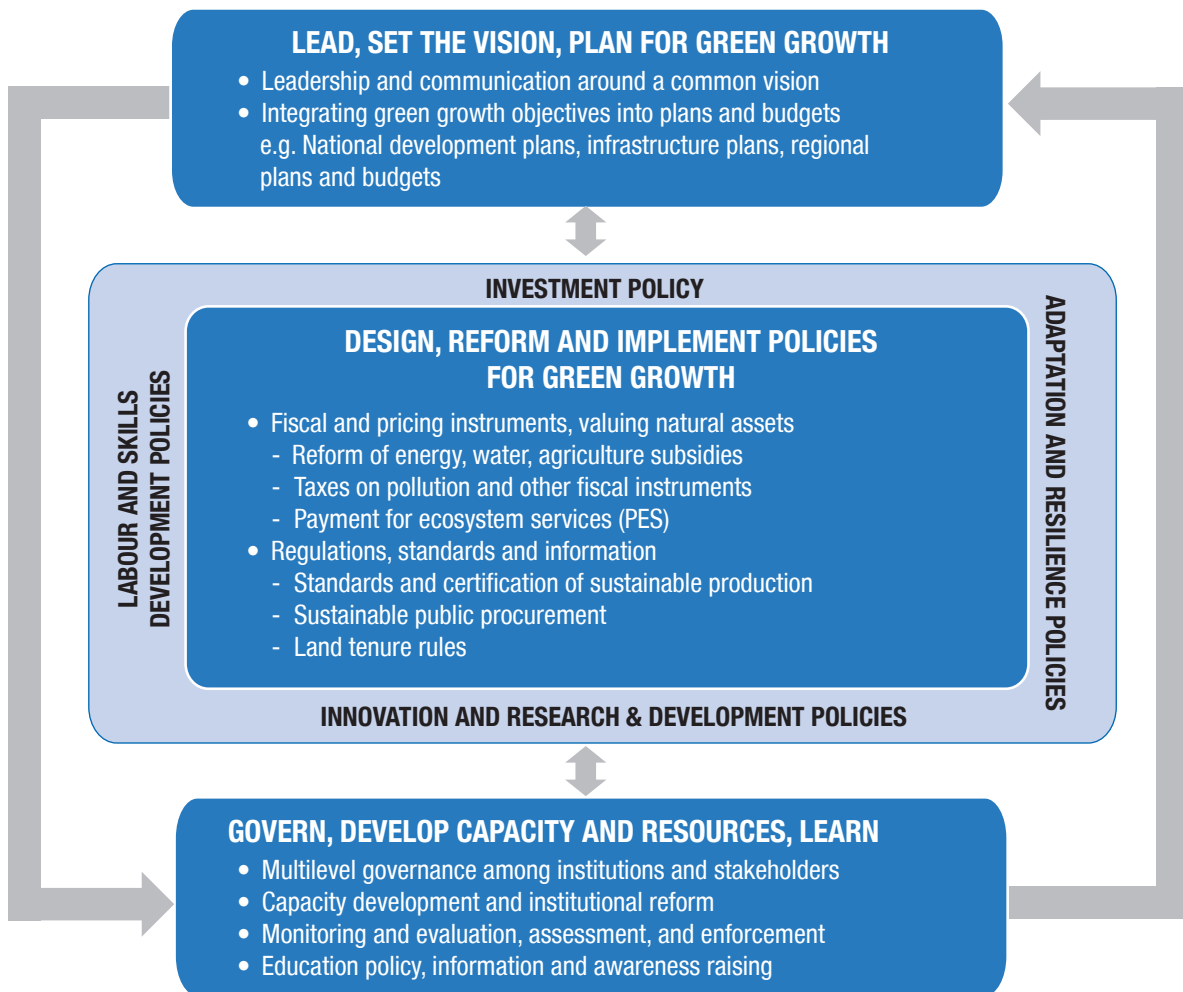
Poor access to sanitation has direct economic costs. The World Bank (2008) found that the economic costs of poor sanitation in Cambodia, Indonesia, the Philippines and Viet Nam were USD 9 billion annually (based on 2005 prices). This corresponds to 1.3% of gross domestic product (GDP) in Viet Nam, 1.5% in the Philippines, 2.3% in Indonesia and 7.2% in Cambodia. These costs include direct financial losses (such as health expenditures or income losses due to poor sanitation), plus losses related to the overall impact of poor sanitation on welfare – including time spent gaining access to clean water and adequate sanitation facilities, impact on education, and reduced revenue from tourism. Direct financial losses amounted to 0.44% of annual GDP in the four countries on average (World Bank, 2008).

4.3. National policies can guide urban development towards green growth

To address the cost of unsustainable urban growth, a range of tools and mechanisms are available to national governments in Southeast Asia. These are best understood within a framework for national action on green growth in developing countries (see Chapter 2). The OECD has identified three major elements of such a framework: 1) establishing leadership, setting the vision and planning for green growth; 2) designing, reforming and implementing policies that stimulate green growth; and 3) governing, developing capacity and resources, and learning (Figure 4.14; OECD, 2013b). This section discusses opportunities for national action within each element, and Table 4.10 at the end of the chapter summarises them. While many cities in Southeast Asia are already pursuing green growth on their own, co-ordinating national and local-level policies is essential for urban areas to effectively contribute to national green growth strategies (OECD, 2014a).

This section first assesses existing national-local co-ordination in Southeast Asia on green growth, including incorporation of urban activities into national plans and financing mechanisms. It then discusses national policy mechanisms that could work in Southeast Asia to manage urban expansion, increase resilience to climate change, reduce air pollution from urban transport, and increase access to basic water and sanitation services.

Figure 4.14. An agenda for national action on green growth in developing countries



Source: OECD (2013b), *Putting Green Growth at the Heart of Development*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264181144-en>.

National-local co-ordination is necessary for urban green growth

National policies play a decisive role in the extent to which urban development contributes to or undermines green growth. National policies establish the regulatory framework within which local governments operate and determine the degree to which cities have authority to regulate and raise revenues for activities within their borders (OECD, 2013a; OECD, 2014b). It is important for national governments to design and, if necessary, reform policies to enable urban activities to align with national green growth goals. Three principles should guide the national-local co-ordination necessary for green growth (OECD, 2013a):

1. ensure national-local policy coherence and create simple policy packages to reduce the risk of incompatible and perverse incentives
2. take a holistic approach to ensure that national green growth regulations, particularly those related to taxes and social benefits, do not adversely affect the urban poor

3. understand the contributions made to green growth by each level of government (e.g. national policies can include price signals or taxes; local policies can shape the built environment to respond to national standards and price signals).

Southeast Asian countries have taken urban activities into account in their green growth, climate change and sustainable development plans to varying degrees (Table 4.6). At one end of the range are countries such as Viet Nam and the Philippines, which identify urban sustainability as a key strategy or outcome in their national plans and have referred to urban issues throughout. Indeed, Viet Nam has specifically addressed the integration of

Table 4.6. Countries vary in their attention to urban policies in national green growth, climate change and sustainable development plans

	Green growth plans	Climate change plans	Sustainable development plans
Cambodia	"Land Use and Ecologically Sound and Healthy Urban Environment" is one of nine long-term interventions	Urban areas only mentioned as regards transport	
Indonesia		Urban areas are not a specific focus but mentioned when relevant to sectoral plans, particularly transportation and other infrastructure	
Lao PDR		Urban development is a key strategic priority	
Malaysia	Showcases "Green Technology Cities" and guidelines for "Green Townships"	Urban areas are not mentioned under the policy's five main strategic principles, but a working committee on transportation was established	
Myanmar		Urban areas are not a specific focus, but they are referred to under goals for transportation, water, sewage and waste infrastructure	
Philippines		Urban areas mentioned under environmentally sustainable transport and climate-proofing infrastructure; green cities and municipalities are one of three outcomes of the National Strategic Priority on Climate-Smart Industries and Services	Includes an action agenda for "urban ecosystems", with eight issue areas and 26 strategies for making urban ecosystems more sustainable.
Singapore		Urban issues are integral to strategy	Urban issues are integral to blueprint
Thailand		Supporting the development of cities and communities is a key approach of the "Mitigation of greenhouse gas emissions and increase of greenhouse gas sinks" strategy	
Viet Nam	Sustainable urbanisation is seen as a solution	Sustainable development of urban areas specifically mentioned as a goal, with other mentions of urban areas regarding water infrastructure and air pollution.	Urban areas mentioned throughout

Note: Light blue refers to weak incorporation of urban policies; darker blue refers to strong incorporation of urban policies; blank cells mean no mention of urban policies.

Sources: Cambodia Ministry of Environment (2009); Cambodia, Royal Government of (2013); Indonesia, Republic of (2007, 2011); Indonesia Ministry of National Development Planning (2009); Lao PDR Department of Environment (2010); Malaysia Ministry of Natural Resources and Environment (2010); Malaysia Ministry of Energy, Green Technology and Water (2012); Myanmar Ministry of Forestry (2009); Philippines Government (1996); Philippines Office of the President (2010, 2011); Singapore Ministry of the Environment and Water Resources and Ministry of National Development (2009); Singapore National Climate Change Secretariat (2012); Thailand Ministry of Natural Resources and Environment (2012); Viet Nam Government (2011); Viet Nam Government (2012a, 2012b).

urban activities into national green growth and climate change plans in two national policy decisions (Box 4.1). Among the other rapidly urbanising countries, Thailand and Malaysia both include significant references to urban issues. Indonesia, however, only mentions urban issues when relevant in sectoral plans, such as transport, water and sanitation.

Box 4.1. Viet Nam is incorporating urban policies into its green growth and climate change strategies

Two recent policy decisions in Viet Nam have addressed the role that urban activities should play in national climate change and green growth policies.

The *Approval of Scheme of Urban Development of Viet Nam Responding to Climate Change for the Period of 2013-2020* (Decision No. 2623/QD-TTg) by the Prime Minister on 31 December 2013 includes provisions to evaluate the impact of climate change on urban systems; to minimise the risk of climate change and sea level rise to construction and urban development; and to fund and assign ministries, sectors and localities to co-ordinate implementation.

The *Approval of National Action Plan on Green Growth for the Period of 2014-2020* (Decision No. 403/QD-TTg) by the Prime Minister on 20 March 2014 sets out action plans for every sector to connect with the national green growth strategy. Recognising the importance of the urban sector, urban development is meant to be one of the implementation goals of the action plans.

National governments also play a decisive role in cities' ability to finance green growth. Firstly, they help channel official development assistance (ODA) and international climate finance towards activities such as adaptation to climate change, air pollution, the provision of basic services, and the reduction of greenhouse gas emissions. For example, in the Philippines climate finance will help fund the Cebu Bus Rapid Transit (BRT) project by using the Clean Technology Fund (an international climate investment fund) for the construction of BRT stations and control systems. An OECD review of bilateral ODA marked for adaptation deployed in urban areas of over 10 000 inhabitants revealed that two of the top five recipients are in Southeast Asia, with Viet Nam being the largest (Figure 4.15). In total, 38% of bilateral urban adaptation-related development co-operation targets countries in Southeast Asia (OECD, 2014d). In terms of total aid for both climate mitigation and adaptation, Viet Nam receives more than the other countries in the region combined (Figure 4.16). While Thailand is not among top recipients of ODA for urban adaptation, it does receive a significant amount for urban mitigation activities, putting it in second place for total urban climate ODA. It is interesting to note that some countries rely almost exclusively on grants – Thailand and Cambodia (for adaptation only), and the Philippines and Lao PDR (for mitigation only) (OECD, 2014d).

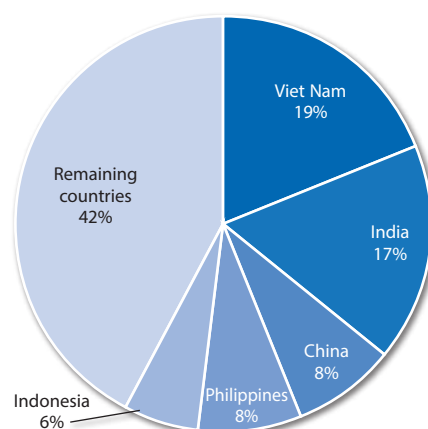
National policy changes may be needed, however, to deploy aid for urban green growth more effectively. The 2013 Global Forum on Using Country Systems to Manage Climate Change Finance concluded that local governments play an important role in the deployment of climate finance, but that this role was not receiving enough attention (Partnership for Climate Finance and Development, 2013). An Asian exception is Nepal, whose National Adaptation Plan for Action includes a target for 80% of climate finance resources to be spent at the village/municipal level (Partnership for Climate Finance and Development, 2013). A 2013 survey of 32 climate finance specialists and stakeholders found that while

engagement with local governments on climate finance was considered effective practice, co-ordination among national and local levels was often a challenge. Direct channelling of external funding to local governments was generally not considered effective as it would operate in parallel with national funding (Ockenden and Zou, 2014 forthcoming).

Secondly, national budget transfers are a much-needed source of funding for environmental activities in cities, and can be used to align green growth activities at the local level with national objectives. For example, while the highly decentralised national government in Indonesia has limited influence over urban policy, it can still provide

Figure 4.15. **Two ASEAN countries are among the top five recipients of adaptation-related ODA in urban areas**

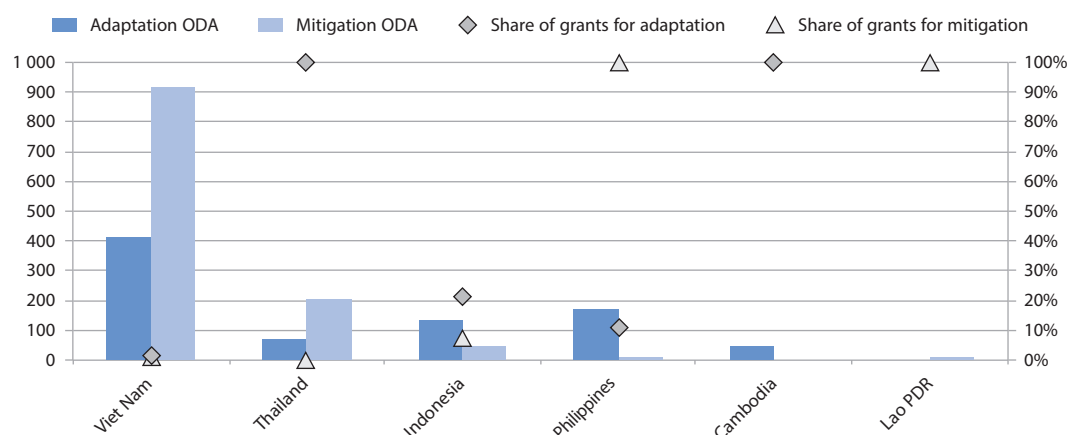
bilateral commitments, 2010-2012 total, Billion USD, constant 2012 prices



StatLink <http://dx.doi.org/10.1787/888933168154>

Source: Author's calculations based on OECD Development Assistance Committee Creditor Reporting System data, July 2014, available at www.oecd.org/dac/stats/rioconventions.htm.

Figure 4.16. **Viet Nam receives the lion's share of ODA for urban adaptation and mitigation**
2010-2012, Million USD (left axis); share of grants or loans (right axis)



StatLink <http://dx.doi.org/10.1787/888933168169>

Note: Values for Malaysia and Myanmar were zero. Brunei Darussalam and Singapore are not recipients of ODA.

Source: Author's calculations based on OECD Development Assistance Committee Creditor Reporting System data, July 2014, available at www.oecd.org/dac/stats/rioconventions.htm.

financial incentives through the Specific Allocation Fund (DAK) of the national Balancing Fund to encourage urban investment in reducing air pollution, increasing climate change adaptation, improving basic services, and other activities contributing to green growth (Indonesia Ministry of Finance, 2014).

Finally, national governments can help build local-level capacity for gaining access to funding (whether national or international funding), for taking on debt, and for managing expenditures (including evaluating their impact). Viet Nam's national government – primarily through the Prime Minister and the Ministry of Construction – is supporting the development and implementation of urban green growth strategies, for example. National support includes capacity building, providing guidelines on local green growth strategies, and channelling ODA funds, which are allocated through a separate central budget. The Viet Nam Urban Forum, made up of national ministries, city governments, development co-operation agencies, and representatives of the private sector and civil society organisations (CSOs), plays an important role in providing support to cities pursuing green growth (Viet Nam Ministry of Construction, 2014).⁴

National-local co-ordination can also help to ensure that urban green growth addresses poverty reduction. In developing countries, national policies addressing urban environmental challenges need to be designed with poverty reduction in mind. It is important to consider how to manage any short-term trade-offs that may affect poorer populations (OECD, 2013b). Any potential impacts on the poor should be addressed primarily at the national level, particularly through the tax and benefits system (OECD, 2013a; OECD, 2014b). National government policies also determine to a great extent the limits of cities' abilities to address environmental and social equity challenges (OECD, 2013a; OECD, 2014b).

National governments can improve how urban expansion is managed

National government policy can help determine the degree to which urban expansion is planned and managed, particularly in terms of setting minimum standards for basic infrastructure in new urban areas before they are developed (OECD, 2014b). However, as noted above, urban expansion in Southeast Asia tends to be driven by the short-term interests of private developers with little consideration of long-term social costs and benefits. Given the relative weakness of the public sector in urban planning, few instruments exist to internalise the costs imposed by private development on infrastructure services (transport, water, sanitation) or to align any development with climate change adaptation plans.

Efforts to better manage urban expansion in Southeast Asia should not however aim to contain urban growth. Rather, national mechanisms could provide a framework for improving the planning and management of Southeast Asian cities. This can be done by anticipating infrastructure needs and directing “trunk infrastructure” towards areas that can handle increased development (Fuller and Romer, 2014). Strict urban growth boundaries are not practical and may lead to “leapfrog” development and more informal settlements. It is advisable, therefore, to identify credible urban growth boundaries that move outwards over time, and which protect areas at high risk from natural disasters or areas providing important ecosystem services from being developed (Angel, 2012).

Setting objectives for urban areas in national green growth plans and incorporating green growth considerations into urban development plans is one way in which national policy can seek to shape urban expansion so that it contributes to green growth objectives. It is particularly important to include green growth in national guidelines for the development of local spatial plans. Most national governments are involved with local

spatial planning to some degree, but the extent to which national guidelines influence local level planning and the actual process of permitting development projects, varies greatly (OECD, 2014b). One priority for national governments interested in making urban expansion consistent with green growth objectives is to strengthen national oversight and guidance of local-level land-use planning and land development decisions, and to build capacity at the local level for land-use planning and development permits. Malaysia's National Physical Plan 2 aims to do this, by requiring new developments to conform to the plan and allowing for updates every five years in order to ensure its relevance. This will help to closely align local plans with national green growth objectives and environmental and economic performance targets more broadly, and could limit “race-to-the-bottom” competition among municipalities.

Another important role for national governments is to support co-ordination among municipalities in the same metropolitan region on urban planning and land-use permit decisions. Large metro regions in ASEAN countries are usually comprised of multiple municipalities, and may even spread across provincial boundaries. This makes collaboration among governments in the metro region difficult. At the same time, a metro-regional approach is needed to manage the impacts of rapid urban development effectively, including increased vulnerability to climate change, air and water pollution, and informal settlements.

Metropolitan areas across the OECD pursue a range of governance approaches, which generally fall into four categories: 1) informal/soft co-ordination; 2) inter-municipal authorities; 3) supra-municipal authorities; and 4) special status of “metropolitan cities” (Table 4.7) (Kim et al., 2014 forthcoming). National governments can provide incentives for metropolitan governance, which most commonly take the form of contractual arrangements and financial transfers. Contractual arrangements generally involve national governments conferring special benefits, such as grants or greater authority to raise revenues, to metropolitan areas in exchange for stronger co-operation among the municipalities in those areas. In the case of financial transfers, national governments may provide grants to

Table 4.7. **Four broad categories of metropolitan governance bodies in OECD metropolitan areas**

a. Informal/soft co-ordination. Often found in urban areas with multiple urban cores (polycentric urban development), lightly institutionalised platforms for information sharing and consultation are relatively easy both to implement and to undo. They typically lack enforcement tools and their relationship with citizens and other levels of government tends to remain minimal.



b. Inter-municipal authorities. When established for a single purpose, such authorities aim at sharing costs and responsibilities across member municipalities – sometimes with the participation of other levels of government and sectoral organisations. Multi-purpose authorities embrace a defined range of key policies for urban development such as land use, transport, and infrastructure.



c. Supra-municipal authorities. An additional layer above municipalities can be introduced either by creating a directly elected metropolitan government, or with the upper governments setting down a non-elected metropolitan structure. The extent of municipal involvement and financial capacity often determines the effectiveness of a supra-municipal authority.



d. Special status of “metropolitan cities”. Cities that exceed a legally defined population threshold can be given the special status of “metropolitan cities”, which puts them on the same footing as the next upper level of government and gives them broader competencies.



Source: Kim, S.J., A. Schumann and R. Ahrend (2014 forthcoming), “What governance for metropolitan areas?” *OECD Regional Development Working Papers*, OECD Publishing, Paris.

inter-municipal bodies or directly to municipalities to encourage the adoption of similar policies across the metropolitan area or to facilitate co-ordination on planning or service provision (Kim et al., 2014 forthcoming).

National governments can also shape green urban investment by modifying investment frameworks to mobilise low-carbon, climate-resilient investment by the private sector. Although green infrastructure is not necessarily more costly than traditional “brown” infrastructure when life-cycle costing and maintenance are taken into account, private-sector investment has not yet occurred on a scale sufficient to meet green growth and climate change mitigation and adaptation goals. Public involvement is still needed to catalyse private investment and overcome barriers, such as lower rates of return and higher risks (Corfee-Morlot et al., 2012).

National governments can also use national tax policy to enable or encourage municipalities to use property taxes and development fees to offset environmental and infrastructure costs and encourage more efficient development patterns. How property taxes are structured affects the form that urban expansion will take (OECD, 2013a; Merk et al., 2012). Contiguous or infill development within the urban core – rather than on the fringe – can be encouraged through taxes that are based on land value rather than on the value of the buildings on the property (which may discourage building on properties in the urban core). Charging fees to developers can also help to offset the costs of the infrastructure investments needed to serve new areas of development, including transport and sanitation services. To discourage sprawling, low-density expansion, however, fees need to be set higher for developments that are further from urban cores (OECD, 2013a; Merk et al., 2012).

National governments concerned about rapid expansion on the urban fringe should consider addressing security as a sustainability issue. A primary attraction of the private “new towns” growing around the outskirts of ASEAN cities such as Jakarta is increased security for residents, whether real or perceived (Firman, 2004b; Firman, 2009). Security also comes in the form of the predictability that private developments can offer in terms of adjacent land uses and the relatively high incomes of neighbouring residents (Hudalah and Firman, 2012). Unless ASEAN cities are able to provide public spaces and residential areas in the urban core in which residents feel safe, it will be difficult to reverse or even slow the development of private communities on the urban fringe. National governments can contribute to the development of safer spaces by supporting local police forces and creating high-quality, safely managed open spaces.

National standards for building energy efficiency affect the energy intensity of the expanding built environment, and can reduce pressure on energy resources. While there are examples throughout the world of municipal governments that have created building energy efficiency standards that are stricter than national standards, these municipal efforts are often limited in scale and impact. National-level building energy efficiency standards have the benefit of having a large-scale impact and creating a minimum standard for all municipalities (OECD, 2010). This still leaves cities the freedom to innovate in implementing these standards in a variety of local contexts, and to apply stricter standards when needed. It is also necessary for building energy efficiency standards to be adequately enforced.

Air pollution calls for national attention

Air pollution from urban transport is a localised problem with national consequences. The rapid growth of private developments with limited access to public transport leaves city dwellers increasingly reliant on private vehicles for travel. For example, in Kuala Lumpur the share of travel by mass transit fell from 35% in 1985 to 10-12% in 2010, despite the opening of three metro lines, a monorail and three commuter rail lines (Cox, 2013). The current share of mass transit use in Kuala Lumpur is actually lower than in the major cities in Western Europe, although it is still higher than cities in the western United States (Cox, 2013). In Metro Manila, where development has focused along highways on the urban fringe, between 1980 and 1996 average trip lengths for residents rose from 5.3 km to 6.4 km and average commuting times to work rose from 36 to 51 minutes (Lebel et al., 2007, citing Lasco et al., 2005).

A primary way for national governments to address urban air pollution from transport is to create a national-level strategy and framework for national-local co-ordination. For example, the Philippines' National Environmentally Sustainable Transportation Strategy has been developed jointly by the Department of Transportation and Communications and the Department of Environment and Natural Resources, along with representatives from 12 national departments and agencies, the Metro Manila Development Authority, CSOs, the private sector and academia (Lontoc, 2014). It is important for such national strategies to be mainstreamed into other national development plans, as has happened in the Philippines, as well as to include mechanisms for national-local co-ordination.

The degree of co-ordination on transport policy among municipalities in the same metropolitan area also has a real impact on air quality. In Santiago, Chile, for example, lack of inter-municipal co-ordination on air quality has contributed to high levels of air pollution (OECD, 2013c). Likewise in many Southeast Asian cities, co-ordination mechanisms are not sufficient to respond to the pace of urban development. For example, while the Metropolitan Manila Development Authority is legally responsible for traffic management in the metropolitan region, in practice it does not undertake metropolitan planning, has little authority to co-ordinate the municipalities in the region, and depends on municipalities for its funding (UN-Habitat, 2010b, citing Laquian, 2002b). Its impact on traffic co-ordination and, by extension, air quality is understandably limited, though this may change given the national effort to create a National Environmentally Sustainable Transportation Strategy mentioned above. The Greater Kuala Lumpur Area has achieved greater co-ordination of its transport systems, thanks in part to the establishment of the area as the federal territory of Putrajaya, and to national government establishment of task forces and co-ordinating mechanisms (UN-Habitat, 2010b citing Jusch et al., 2009 and Muhamed, 1997).

National governments could do more to ensure transport and air quality co-ordination among urban municipalities by providing incentives or requiring such co-ordination. For example, urban areas in the United States are required to designate a Metropolitan Planning Organization to receive and manage federal transportation funds (AMPO, 2013). Some of these organisations have expanded their activities to include inter-municipal co-ordination of spatial planning, as in the case of the Chicago Metropolitan Agency for Planning, although these plans are not legally binding (OECD, 2012d). Such examples, though from outside developing and emerging Asia, highlight ways in which even federal, decentralised governments can create incentives for inter-municipal co-ordination.

National governments also have an important role to play in enabling public transport investment at the local level. Of the many actors involved in financing urban public transport investments (Table 4.8), national governments are unique in that they set

the regulatory framework for allocating national budgets (including support provided through ODA and climate finance) to local-level transport projects (Ang and Marchal, 2013, citing Sakamoto et al., 2010b). They are also able to remove any national barriers to local governments' ability to raise revenues and set taxes and fees to finance transport investment (OECD, 2014b).

Table 4.8. **Many actors are involved in financing urban public transport systems in developing countries**

Key actors	Role
Development co-operation agencies/ international organisations	<ul style="list-style-type: none"> • Providing financing, e.g. through official development assistance (ODA) • Promoting good governance • Providing technological support
Local city administrations	<ul style="list-style-type: none"> • Raising local financial resources • Co-ordinating funding and implementing policies • In some cases, operating public transport systems
National and regional governments	<ul style="list-style-type: none"> • Raising national resources • Setting rules for allocation and distribution at national and local level
Public transport authorities	<ul style="list-style-type: none"> • Securing the provision and development of public transport services, including through planning, infrastructure provision and traffic management
Citizens	<ul style="list-style-type: none"> • Users of public transport systems • Funders by paying taxes, charges, fees and fares • Voters
Private sector	<ul style="list-style-type: none"> • Operating public transport • Manufacturing vehicles • Providing infrastructure
Private financiers	<ul style="list-style-type: none"> • Acting as equity investors or providers of loans and grants

Sources: Ang, G. and V. Marchal (2013), “mobilising private investment in sustainable transport: the case of land-based passenger transport infrastructure”, *OECD Environment Working Papers*, No. 56, OECD Publishing, <http://dx.doi.org/10.1787/5k46hjm8jpmv-en>; Sakamoto, K. and S. Belka (2010b), “Financing sustainable urban transport”, Module 1f in *Sustainable Transport: A Sourcebook for Policy-makers in Developing Countries*, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, www.sutp.org/index.php/component/phocadownload/category/23-1f?download=23:1f-fsut-en.

Public intervention is needed to enable public and private investment in low-carbon climate-resilient public transport investment. Traditional sources of financing are hard to attract to sustainable transport infrastructure projects given their high upfront capital costs, low returns, and long development and payback periods compared to more traditional transport investments such as toll highways (Ang and Marchal, 2013; Corfee-Morlot et al., 2012). National governments can help enable and co-ordinate the use of innovative financing tools, including public-private partnerships, green bonds and climate finance (Table 4.9).

Land-value capture tools merit particular attention. These allow local governments to finance transport investments by taxing or charging private sector developers for a share of the increases in real estate value expected from their investment (OECD, 2013a; Merk et al., 2012). These tools have the advantage of generating revenues up front and reducing the degree to which local governments take on debt. They include tax increment financing

districts and assessment districts; development charges, impact fees and transportation utility fees; transferable development rights from the rent of sales of public property land or building rights; developer land sales; joint public-private property development (e.g. Hong Kong); and additional revenues from ancillary real estate development (Ang and Marchal, 2013; Merk et al., 2012; Peterson, 2012).

Table 4.9. A range of financing tools can channel private investment in sustainable transport infrastructure

Type of instrument	Level of governance	Benefits for the private sector
Public-private partnerships	Local/national	Share and mitigate risk for private actors
Land value capture tools	Local/national	Reduce investment risk
Grants and loans	International/ national/ local	Reduce upfront capital costs for private sector
Loan guarantees and credit enhancement	International/ national/local	Reduce financing risk, lower the cost of capital
Green bonds	National/local	Access capital from institutional investors for large-scale rail and metro projects
Climate finance	International/national	Leverage private finance, access resources from IFIs and gain political support from local governments

Source: Adapted from Ang, G. and V. Marchal (2013), “Mobilising private investment in sustainable transport: the case of land-based passenger transport infrastructure”, *OECD Environment Working Papers*, No. 56, OECD Publishing, <http://dx.doi.org/10.1787/5k46hjm8jpmv-en>.

In addition to planning, co-ordination and financing, by setting standards – particularly vehicle emissions standards – national governments can also affect urban air pollution levels significantly. Southeast Asian countries are generally improving their vehicle emissions standards, but many are still far behind those of the European Union. Some countries do not have firm plans to move beyond Euro 2 vehicle emissions standards (Figure 4.17) (CAI-Asia, 2011a). The exceptions are Singapore, Thailand, Malaysia, the Philippines and Viet Nam, whose governments approved a new motor vehicle emission standard in 2011 that would require automobiles to comply with Euro 4 emission standards and motorcycles to comply with Euro 3 emission standards by 2017 (CAI-Asia, 2011b). Most countries in Southeast Asia have also been slow to reduce the levels of sulphur in diesel fuel – a major contributor to particulate matter (PM) pollution (Figure 4.18). Exceptions are Singapore and Thailand, whose efforts to reduce sulphur in fuel have corresponded to lower levels of PM₁₀, carbon monoxide and nitrogen dioxide (CAI-Asia, 2011a).

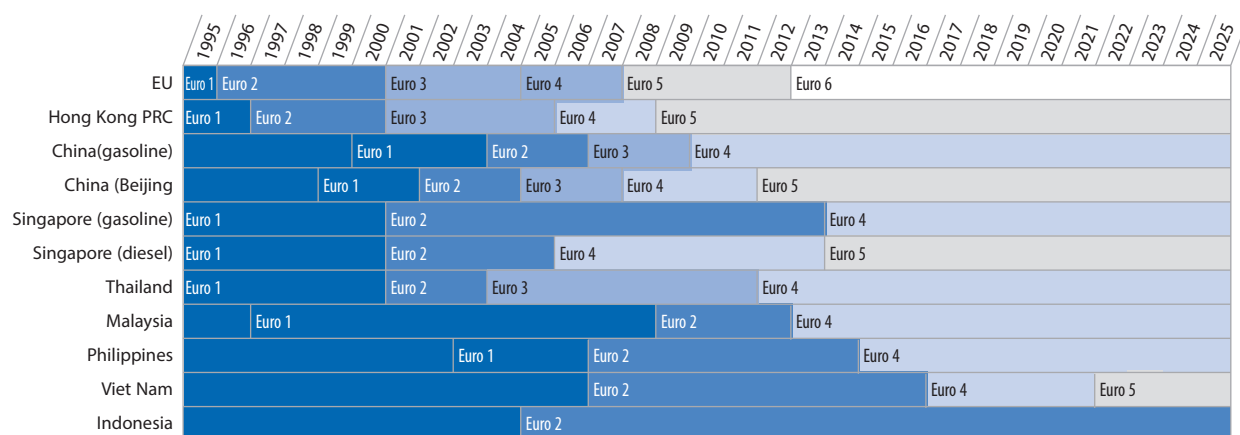
Finally, national government support is often needed to help build local capacity for transport planning. Providers of development co-operation are active in this area. For example, the German development agency Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), in partnership with ASEAN, provides technical assistance and capacity building for air quality management and the development of clean air action plans

to smaller cities in the ASEAN region. GIZ provides funding and technical expertise, while national governments are expected to help support the implementation of cities' clean air action plans through legislation, funding and human resources (ASEAN-German Technical Co-operation, 2013).

National action can build urban resilience to climate change

As we saw above, many cities in Southeast Asia are vulnerable to the impacts of climate change. The degree to which urban expansion is managed will have a direct impact on cities' vulnerability, particularly to flooding. Although the impacts of climate change

Figure 4.17. ASEAN ambition is generally low for new light duty vehicle emissions standards



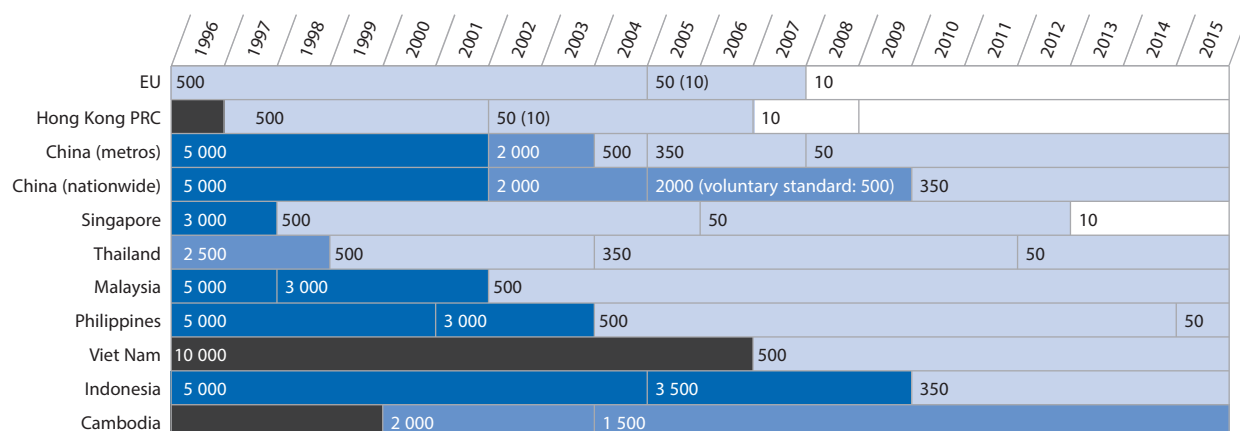
StatLink <http://dx.doi.org/10.1787/888933168174>

Note: Data not available for Brunei Darussalam, Cambodia, Lao PDR and Myanmar.

Source: Adapted from CAI-Asia (2011a), "Road map to cleaner fuels and vehicles in Asia", *CAI-Asia Factsheet* No. 17, September 2011, Clean Air Initiative for Asian Cities Center-Asia, Pasig City, Philippines.

Figure 4.18. Reductions in diesel sulphur levels have been slow

Current and proposed sulphur levels in diesel in Asia, EU and US, parts per million



StatLink <http://dx.doi.org/10.1787/888933168184>

Note: Data not available for Brunei Darussalam, Lao PDR and Myanmar.

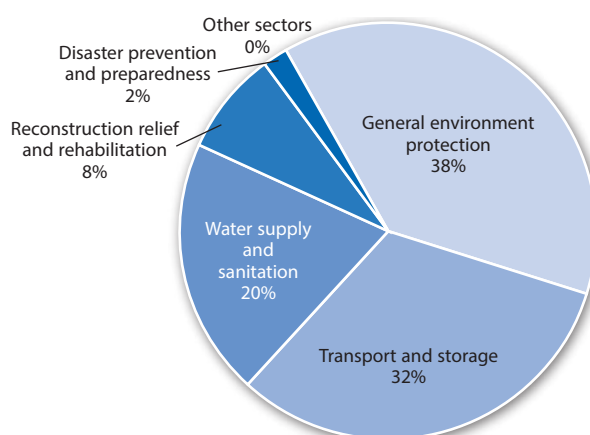
Source: Adapted from CAI-Asia (2011a), "Road map to cleaner fuels and vehicles in Asia", *CAI-Asia Factsheet* No. 17, September 2011, Clean Air Initiative for Asian Cities Center-Asia, Pasig City, Philippines.

tend to be locally concentrated, national government action is still crucial. This begins with national leadership; in a meeting of urban-level leaders in climate adaptation from around the world, participants highlighted the importance of a national political commitment to urban climate adaptation. Even simple national statements in support of adaptation were considered useful, although participants did note that mandates, policies and laws were important to turn these statements into action (Carmin et al., 2013). Other roles for national government include spatial planning, channelling funds for adaptation actions and slum upgrading, providing information and building local capacity, discussed in turn below:

- *Spatial planning.* National governments can enable local-level action on adaptation through the spatial planning system. For example, in Indonesia the World Bank has introduced a three-part framework for building urban resilience. The first part involves incorporating disaster and climate change risk into land-use and infrastructure investment planning (World Bank, 2014). This approach involves using regional spatial plans (*Rencana Tata Ruang Wilayah*, RTRW) as the starting point to subsequently develop more-detailed spatial plans (*Rencana Detail Tata Ruang*, RDTR) in priority development areas and areas of high risk. Some Indonesian cities have already incorporated disaster and climate risks into their RTRWs, including Balikpapan, Denpasar and Yogyakarta (World Bank, 2014).
- *Finance provision.* City governments in many cases depend on national governments to channel climate finance and other international funds for adaptation to the local level. As mentioned above, Southeast Asia is an important recipient of development co-operation for urban-level adaptation. In Southeast Asia this mainly targets water supply and sanitation; environmental policy and capacity building; transport and storage; and disaster risk reduction and response (Figure 4.19). This indicates that providers of development co-operation place high importance on access to basic services for urban populations vulnerable to climate change (e.g. water supply and sanitation, transport and storage), but that they are also aware of the particular vulnerability of Southeast Asian cities to natural disasters exacerbated by climate change. For example, Southeast Asia receives 75% of all urban adaptation-related

Figure 4.19. **Access to services is a high priority for urban adaptation ODA in Southeast Asia**

2010-12 total, bilateral commitments, Million USD, constant 2012 prices



StatLink <http://dx.doi.org/10.1787/888933168199>

Source: Author's calculations based on OECD Development Assistance Committee Creditor Reporting System data, July 2014, available at www.oecd.org/dac/stats/rioconventions.htm.

bilateral ODA destined for disaster risk reduction and response, and 88% of the urban adaptation-related ODA aimed at “general environmental protection” (which includes support to building environment-related capacity and policies) (OECD, 2014d).

- *Slum upgrading.* The lack of basic services and adequate structures in most informal settlements make them particularly vulnerable to climate risks, including flooding and seawater storm surges. An important part of green urban development involves the upgrading of slums and other informal settlements to improve access to clean drinking water and adequate sanitation, as well as to strengthen their resilience to natural disasters. As discussed previously, poor water and sanitation affects human well-being and has high economic costs. This is due in part to health costs, as well as increased vulnerability to natural disasters. While providing access to drinking water and sanitation services is generally the responsibility of sub-national governments, national governments can help improve the extent and quality of services in the least-served areas by making slum upgrading a priority, attracting international investment in water and sanitation, and monitoring and evaluating slum upgrading activities (see Box 4.2).

Box 4.2. Upgrading slums to build climate resilience

Several Southeast Asian countries have successfully implemented large-scale improvements in slum areas. These include Indonesia’s *Kampung* Improvement Programme, and Manila’s *Tondo* Urban Development Project. Factors contributing to the success of slum upgrading across the Asia-Pacific include awareness raising and advocacy for the needs of slum residents, including community input; long-term political commitment; policy and institutional reform; careful implementation and monitoring; and scaling up of successful projects. The share of slum dwellers across the Asia-Pacific is declining, but at a slower rate than poverty, in part due to unaffordable housing costs.

Monitoring and evaluation merit particular attention, and Indonesia and Viet Nam have used monitoring systems and indicators to identify trends and improve slum upgrading efforts. Collecting and using data on land tenure and living conditions can also be a form of community empowerment, as in Phnom Penh, where CSOs have been involved in surveys of low-income communities and opportunities for development of vacant land.

National governments can also help to improve slum conditions by granting tenure to inhabitants of informal settlements. Giving residents secure tenure creates incentives for improving their homes and neighbourhoods, thus further contributing to the upgrading of slum areas. In the Philippines, land proclamations have been made to regularise the tenure of inhabitants on public land and to commit to the improvement of social services. Between 2000 and 2002 alone, this benefited over 645 000 families.

Financing slum upgrading remains a challenge. For example, international aid is no longer available to fund the Indonesian *Kampung* Improvement Programme, thus limiting its ability to meet the needs of a growing slum population. As shown in Figure 4.20 above, the water supply and sanitation sector receives a fifth of urban climate adaptation-related ODA in Southeast Asia. Framing slum upgrading in terms of urban adaptation to climate change may open up new opportunities to use climate finance and climate-related aid to improve living conditions for Southeast Asia’s urban poor.

Source: UN Habitat (2010b).

- *Capacity building.* National governments can provide the information necessary for local governments – and local people – to assess climate risks and plan for adaptation (OECD, 2010; Corfee-Morlot et al. 2012). Local government officials tend not to have the capacity or technical resources needed to identify and prepare for climate-related disasters. For example, fewer than 20% of all cities in Asia and the Pacific have conducted climate risk assessments (ADB, 2013, citing Carmin et al., 2012). National support can provide the policy frameworks, minimum standards, resources and technical information needed for cities to adapt to climate change (Carmin et al., 2013; OECD, 2010). This may be done with the support of development co-operation providers and can be anchored in building local research capacity. For example, a partnership led by the Indonesian National Disaster Management Agency (BNPB) and the Australian development agency AusAID organised participatory risk mapping in Jakarta for flood contingency planning. Led by the Province of Jakarta’s Disaster Management Agency, the mapping effort involved over 500 people representing all 267 urban villages in the metropolitan area. BNPB is now replicating this effort in other high-risk Indonesia cities (Jha and Stanton-Geddes, 2013). International networks of cities are also a good way to develop and share innovative solutions to urban climate risks (Box 4.3).

Box 4.3. The 100 Resilient Cities programme

The 100 Resilient Cities, a network initiated by the Rockefeller Foundation, helps cities increase their resilience to both “shocks”, such as natural disasters, and “stresses”, such as inefficient public transport services or water shortages. Cities participating in the network receive the resources needed to create a “roadmap to resilience”. Southeast Asia is home to four of the first 32 cities selected for the network:

- Da Nang in Viet Nam has established early flood warning systems and improved urban planning to increase resilience to climate change
- Semarang in Indonesia has reduced the risk of tidal and flash floods in part through rehabilitating mangroves and establishing early warning systems
- Bangkok in Thailand has developed a flood management manual for the city
- Mandalay in Myanmar is incorporating resilience into city planning

Source: Rockefeller Foundation (2014).

- *Information provision.* Information on climate risks, when made available to the public, can also improve enforcement of building codes and other standards for development in high-risk areas. Many Southeast Asian countries already have adequate building standards for areas at risk of flooding and other natural disasters such as earthquakes, but they are poorly enforced. Putting risk assessments out into the public domain can enable CSOs and individuals to identify developments that do not meet risk standards. National governments can also enable private sector risk-sharing, for example through insurance markets, but this is only possible in areas where markets function well.

Table 4.10. National policy levers to manage urban green growth in Southeast Asia

Policy goal	Manage urban expansion	Reduce air pollution from urban transport	Adapt and increase resilience to climate change	Increase access to basic services and upgrade informal settlements
Leadership, visioning and planning	<ul style="list-style-type: none"> Incorporate urban development into green growth plans and incorporate green growth into urban development plans and urban infrastructure planning Support urban planning and land-use permitting decisions at the scale of metropolitan regions Plan ahead for infrastructure in areas where urban development is likely 	<ul style="list-style-type: none"> Create a strategy for air quality and sustainable urban transport, and a framework for national-local co-ordination Require or provide incentives for inter-municipal co-ordination on air quality at the metropolitan regional level Emphasise the link between local air pollution, land use and transport in national development plans 	<ul style="list-style-type: none"> Express political commitment to urban adaptation, and include urban activities in national adaptation plans Incorporate climate change adaptation into urban planning and urban infrastructure planning and investments Support national-local and inter-municipal co-ordination for adaptation 	<ul style="list-style-type: none"> Express long-term national political commitment to slum upgrading
Designing, reforming and implementing policies	<ul style="list-style-type: none"> Enable and encourage municipalities to collect fees for development Review and reform hidden incentives in property taxes and local revenue mechanisms to encourage managed development near infrastructure Set and enforce standards for building energy efficiency Increase support for urban police forces to improve personal security in central urban areas as a means to counteract sprawl 	<ul style="list-style-type: none"> Enable international and private investment in urban public transport, including from ODA and climate finance; enact relevant urban policy reform Remove barriers and incentivise local funding mechanisms, including value-capture and transport-oriented development Set stringent national fuel emissions standards and remove national fossil fuel subsidies 	<ul style="list-style-type: none"> Set climate-resilient building and infrastructure standards Establish urban disaster risk management and response policies Establish disaster risk transfer and risk-sharing policies Regulate infrastructure siting and zoning to conserve land for urban and peri-urban ecosystems that contribute to resilience 	<ul style="list-style-type: none"> Regularise land tenure Enable international and private investment in water and sanitation services, including ODA and climate finance
Governing, learning and developing capacity and resources	<ul style="list-style-type: none"> Build capacity for land-use planning and development permitting Apply risk screening to new urban developments to prevent and manage climate-related risks 	<ul style="list-style-type: none"> Build capacity in public transport planning and air quality management, including research and data collection, air pollution modelling, and risk assessments 	<ul style="list-style-type: none"> Channel climate-related aid and climate finance to regional and municipal governments Provide information, data, and locally relevant and timely risk mapping of vulnerable areas Build capacity for local-level risk assessments and adaptation efforts Enforce building codes and prohibitions on building in at-risk zones Create mechanisms for engaging civil society organisations and businesses 	<ul style="list-style-type: none"> Monitor and evaluate slum upgrading activities Create mechanisms to engage slum dwellers and local community leaders to improve services Scale up successful slum upgrading projects

4.4. Conclusion: Now is the time to lock in sustainable urban development

In most Southeast Asian countries, urban activities already have the potential either to undermine – or contribute to – national green growth. Over half of the countries in Southeast Asia have a pronounced urban character, and the urban population across the region is growing rapidly. Countries now have a window of opportunity to lock in urban development patterns that are sustainable over the long term. These include managed urban expansion through providing adequate infrastructure and reducing reliance on personal motorised vehicles; planning and investing in infrastructure that is resilient to climate change impacts; reducing air and water pollution levels even as urban populations grow; and formalising and improving informal settlements (Table 4.10).

National leadership is needed to make sure urban action is effective and consistent with national green growth objectives. While urban green growth takes place in cities, national frameworks determine the actions cities can take. Incorporating cities into national climate change and green growth strategies can make it easier for local leaders to attract political and financial support to develop sustainably, including adapting to climate change. National tax policies need to be reviewed to ensure that they do not favour growth on the urban fringe, or limit cities' ability to collect fees from developers to fund infrastructure services. Governance structures that provide clearly defined national and local roles, and increase capacity at the local level, are needed to initiate and sustain a shift towards green growth.

Notes

1. This chapter has been drafted in consultation with the OECD project on Urban Green Growth in Dynamic Asia, which builds on the previous OECD Green Growth in Cities project (see OECD (2014a) *Urban Green Growth in Dynamic Asia: A conceptual framework*, available at www.oecd.org/regional/regional-policy/Urban-GG-Dynamic-Asia-report.pdf). The chapter's focus on national policies complements that project's conceptual framework, which primarily covers urban-level activities to pursue green growth.
2. Urban sprawl can be defined as low-density urban expansion in which land uses are separated and development “leaps” over undeveloped land (OECD, 2012a).
3. Characterised by socio-economic change, subsidence, sea-level rise of 20cm by 2050 and adaptation measures that maintain 2005 flood defences and constant flood probability.
4. Several provincial cities are well advanced in the development of their green growth strategy: Ha Long (province of Quang Ninh), Bac Ninh (province of Bac Ninh), Thanh Hoa (province of Thanh Hoa), Hoi An (province of Quang Nam), Ben Tre (province of Ben Tre), Da Lat (province of Lam Dong), Ha Tinh (province of Ha Tinh), Phan Rang, Thap Cham (province of Ninh Thuan), Binh Thuan (province of Binh Thuan), Hue (province of Thua Thien Hue), Vinh Yen (province of Vinh Phuc), Ha Giang (province of Ha Giang) (Viet Nam Ministry of Construction, 2014).

Bibliography

- ADB (2013), *Investing in Resilience: Ensuring a disaster-resistant future*, Asian Development Bank, Manila.
- ADB (2012), “Green urbanization in Asia”, special chapter in *Key Indicators for Asia and the Pacific 2012*, Asian Development Bank, Manila.
- AMPO (2013), “About AMPO”, AMPO website, Association of Metropolitan Planning Organizations, Washington, DC, available at www.ampo.org/about-us/about-ampo, accessed 24 September 2014.
- Ang, G. and V. Marchal (2013), “Mobilising private investment in sustainable transport: the case of land-based passenger transport infrastructure”, *OECD Environment Working Papers*, No. 56, OECD Publishing, <http://dx.doi.org/10.1787/5k46hjm8jpmv-en>.
- Angel, S. (2012), *Planet of Cities*, Lincoln Institute of Land Policy, Cambridge, MA.
- ASEAN-German Technical Cooperation (2013) “Contributions”, Clean Air for Smaller Cities in the ASEAN Region website, ASEAN-German Technical Cooperation, available at www.citiesforcleanair.org/?page_id=18, accessed 3 June 2014.
- CAI-Asia (2011a), “Road map to cleaner fuels and vehicles in Asia”, *CAI-Asia Factsheet* No. 17, September 2011, Clean Air Initiative for Asian Cities Center, Pasig City, Philippines.
- CAI-Asia (2011b), *Viet Nam Sets Vehicle Emission Standards and Fuel Quality Roadmap*, Clean Air Initiative for Asian Cities Center, Pasig City, Philippines.
- Cambodia Ministry of Environment (2009), *The National Green Growth Roadmap*, Ministry of Environment, Phnom Penh.
- Cambodia, Royal Government of (2013), *Cambodia Climate Change Strategic Plan 2013-2023*, Royal Government of Cambodia, Phnom Penh, available at www.kh.undp.org/content/dam/cambodia/docs/EnvEnergy/CCCAProjects/Cambodia%20climate%20change%20strategic%20plan%202014-2023.pdf.
- Carmin, J., D. Dodman and E. Chu (2013), “Urban climate adaptation and leadership: from conceptual understanding to practical action”, *OECD Regional Development Working Papers*, 2013/26, OECD Publishing, <http://dx.doi.org/10.1787/5k3ttg88w8hh-en>.
- Corfee-Morlot, J. et al. (2012), “Towards a green investment policy framework: the case of low-carbon, climate-resilient infrastructure”, *OECD Environment Working Papers*, No. 48, OECD Publishing, <http://dx.doi.org/10.1787/5k8zth7s6s6d-en>.
- Cox, W. (2013), “The evolving urban form: Kuala Lumpur”, newgeography blog, available at: www.newgeography.com/content/003395-the-evolving-urban-form-kuala-lumpur, last accessed 5 March 2014.
- Firman, T. (2009), “The continuity and change in mega-urbanization in Indonesia: A survey of Jakarta-Bandung Region (JBR) development”, *Habitat International*, Vol. 33, pp. 327-339.
- Firman, T. (2004a), “Major issues in Indonesia’s urban land development”, *Land Use Policy*, Vol. 21, pp. 347-355.

- Firman, T. (2004b), *Large-Scale Housing and New Town Development in Jakarta Metropolitan Area (JMA): Towards an urban spatial segregation*, Department of Regional and City Planning, Institute of Technology Bandung, Bandung, available at www.lib.gla.ac.uk/media/media_132462_en.pdf.
- Fuller B. and P. Romer (2014), “Urbanisation as opportunity”, Chapter 6 in OECD (2014), *OECD Regional Outlook 2014: Regions and Cities: Where policies and people meet*, OECD Publishing, <http://dx.doi.org/10.1787/9789264201415-en>.
- Hallegatte, S., C. Green, R. Nicholls and J. Corfee-Morlot (2013a), “Future flood losses in major coastal cities,” *Nature Climate Change*, Vol. 3, pp. 802-806.
- Hallegatte, S., C. Green, R. Nicholls and J. Corfee-Morlot (2013b), “Future flood losses in major coastal cities: Supplementary information”, *Nature Climate Change*.
- Hanson, S. et al. (2011), “A global ranking of port cities with high exposure to climate extremes”, *Climatic Change*, Vol. 104, pp. 89-111.
- Hudalah, D. and T. Firman (2012), “Beyond property: industrial estates and post-suburban transformation in Jakarta Metropolitan Region” *Cities*, Vol. 29, pp. 40-48.
- Indonesia Ministry of Finance (2014), “Urbanization in Indonesia”, presentation by Mochamad Bara Ampera, Head of Transportation, Energy & Other Sectors, Centre for Climate Change Financing and Multilateral Policies, Ministry of Finance at the *Towards Green Growth in Southeast Asia Regional Workshop*, organised by the OECD and the Indonesia Ministry of Finance, 12-13 June 2014.
- Indonesia Ministry of National Development Planning (2009), *Indonesia Climate Change Sectoral Roadmap (ICCSR) Synthesis Report*, Ministry of National Development Planning/National Development Planning Agency, Jakarta.
- Indonesia, Republic of (2011), *Presidential Regulation of the Republic of Indonesia No. 61, on The National Action Plan for Greenhouse Gas Emissions Reduction*, Republic of Indonesia, Jakarta.
- Indonesia, Republic of (2007), *National Action Plan Addressing Climate Change (RAN MAPI)*, Republic of Indonesia, Jakarta.
- Institute for Health Metrics and Evaluation (2013), *The Global Burden of Disease (GBD) Visualizations: GBD compare*, Institute for Health Metrics and Evaluation, Seattle, <http://viz.healthmetricsandevaluation.org/gbd-compare/>.
- Isen, A., M. Rossin-Slater and W.R. Walker (2014), “Every breath you take – every dollar you’ll make: the long-term consequences of the Clean Air Act of 1970”, *NBER Working Paper* No. 19858, January 2014, National Bureau of Economic Research, Cambridge, MA.
- Jha, A. and Z. Stanton-Geddes (eds.) (2013), *Strong, Safe, and Resilient: A Strategic policy guide for disaster risk management in East Asia and the Pacific*, Directions in Development, The World Bank, Washington, DC.
- Jha, A., R. Bloch and J. Lamond (2012), *Cities and Flooding: A guide to integrated urban flood risk management for the 21st century*, The World Bank, Washington, DC.
- Kan, H. and B. Chen (2004), “Particulate air pollution in urban areas of Shanghai, China: health-based economic assessment”, *Science of the Total Environment*, Vol. 322, Issues 1-3, pp 71-79.

- Kim, S.J., A. Schumann and R. Ahrend (2014, forthcoming), “What governance for metropolitan areas?” *OECD Regional Development Working Papers*, OECD, Paris.
- Lao PDR Department of Environment (2010), *Strategy on Climate Change of the Lao PDR*, Department of Environment, Watershed Resource and Environment Administration, Vientiane.
- Lebel, L. et al. (2007), “Integrating carbon management into the development strategies of urbanizing regions in Asia: implications of urban function, form, and role”, *Journal of Industrial Ecology*, Vol. 11, no. 2, pp. 61-81, MIT Press, Cambridge, MA.
- Lontoc, A. (2014), “Mainstreaming low carbon path in the transport sector in the national and local levels: case of the Philippines”, webinar by Anneli R. Lontoc, Undersecretary, Philippines Department of Transportation and Communications, presented by LEDSGP Global Partnership and World Resources Institute-EMBARQ, 30 April 2014, available at <http://en.openei.org/wiki/LEDSGP/sector/transport>.
- Malaysia Ministry of Energy, Green Technology and Water (2012), *The National Green Technology Policy, Government Initiatives & Incentives*, Presentation by Malaysia Green Technology Corporation on behalf of the Ministry of Energy, Green Technology and Water, 26th June 2012.
- Malaysia Ministry of Natural Resources and Environment (2010), “National Policy on Climate Change”, Presentation by the Ministry of Natural Resources and Environment at the *Workshop on Climate Change & Biodiversity: Mobilizing the Research Agenda, 13-14 December 2010*, National University of Malaysia (UKM), Bangi, available at www.ukm.my/myc/pdf/workshop/DAY%20ONE_SESSION1/Prof%20Pereira_for%20NRE.pdf.
- McGee, T.G. (2005), “Distinctive urbanization in the peri-urban regions of East and Southeast Asia: renewing the debate”, *Jurnal Perencanaan Wilayah dan Kota*, Vol. 16, no. 1, pp. 39-55, Institut Teknologi Bandung, Indonesia.
- Merk, O. et al. (2012), “Financing green urban infrastructure”, *OECD Regional Development Working Papers 2012/10*, OECD Publishing, <http://dx.doi.org/10.1787/5k92p0c6j6r0-en>.
- Myanmar Ministry of Forestry (2009), *National Sustainable Development Strategy for Myanmar*, Nay Pyi Taw, Myanmar, www.rrcap.ait.asia/nsds/uploadedfiles/file/Publication%201-NSDS%20Myanmar.pdf.
- Ockenden, S. and S. Zoud (2014 forthcoming), “What enables effective international climate finance in the context of development co-ordination?”, *OECD Development Co-operation Working Papers*, OECD, Paris.
- OECD (2014a), *Urban Green Growth in Dynamic Asia: A conceptual framework*, OECD, Paris, available at www.oecd.org/regional/regional-policy/Urban-GG-Dynamic-Asia-report.pdf.
- OECD (2014b), “A National strategy for cities: taking ownership of urban policy”, Chapter 5 in OECD (2014), *OECD Regional Outlook 2014: Regions and Cities: Where Policies and People Meet*, OECD Publishing, <http://dx.doi.org/10.1787/9789264201415-en>.
- OECD (2014c), *The Cost of Air Pollution: Health impacts of road transport*, OECD Publishing, <http://dx.doi.org/10.1787/9789264210448-en>.
- OECD (2014d), OECD Development Assistance Committee Creditor Reporting System data, July 2014, available at www.oecd.org/dac/stats/rioconventions.htm.

- OECD (2013a), *Green Growth in Cities*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264195325-en>.
- OECD (2013b), *Putting Green Growth at the Heart of Development*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264181144-en>.
- OECD (2013c), *OECD Urban Policy Reviews, Chile 2013*, OECD Publishing, <http://dx.doi.org/10.1787/9789264191808-en>.
- OECD (2012a), *Compact City Policies: A Comparative Assessment*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264167865-en>.
- OECD (2012b), *OECD Environmental Outlook to 2050: The consequences of inaction*, OECD Publishing, <http://dx.doi.org/10.1787/9789264122246-en>.
- OECD (2012c), *Mortality Risk Valuation in Environment, Health and Transport Policies*, OECD Publishing, <http://dx.doi.org/10.1787/9789264130807-en>.
- OECD (2012d), *OECD Territorial Reviews: The Chicago Tri-State Metro-Area, United States*, OECD, Paris.
- OECD (2010), *Cities and Climate Change*, OECD Publishing, <http://dx.doi.org/10.1787/9789264091375-en>.
- Partnership for Climate Finance and Development (2013), *Global Forum Summary: Using Country Systems to Manage Climate Change Finance*, 2-3 December 2013, Incheon, Republic of Korea, available at www.climatefinance-developmenteffectiveness.org/globalforum2013.
- Percival, T. and P. Waley (2012), “Articulating intra-Asian urbanism: the production of satellite cities in Phnom Penh”, *Urban Studies*, Vol. 49, pp. 2873-2888.
- Peterson, G. (2012), “Unlocking land values to finance urban infrastructure”, *Trends and Policy Options* No. 7, The World Bank, Washington, DC, www.ppiaf.org/sites/ppiaf.org/files/publication/Trends%20Policy%20Options-7-Unlocking%20Land%20Values%20-GPeterson.pdf.
- Philippines Government (1996), *Philippine Agenda 21 (PA21): A National Agenda for Sustainable Development for the 21st Century*, Philippines Government, Manila, available at www.psdn.org.ph/agenda21.
- Philippines Office of the President (2011), *National Climate Change Action Plan 2011-2028*, Climate Change Commission, Office of the President, Malacanang, Metro Manila.
- Philippines Office of the President (2010), *National Framework Strategy on Climate Change 2010-2022*, Climate Change Commission, Office of the President, Malacanang, Metro Manila.
- Porio, E. (2009), *Urban Transition, Poverty, and Development in the Philippines: A preliminary draft*, Ateneo de Manila University, Department of Sociology and Anthropology, available at: <http://pubs.iied.org/pdfs/G02570.pdf>.
- Quah, E. and T.L. Boon (2003), “The economic cost of particulate air pollution on health in Singapore”, *Journal of Asian Economics*, Vol. 14, pp. 73-90.
- Quang, N. and H.D. Kammeier (2002), “Changes in the political economy of Viet Nam and their impacts on the built environment of Hanoi”, *Cities*, Vol. 19, no. 6, pp. 373-388.

- Resosudarmo, B.P. and L. Napitupulu (2004), “Health and economic impact of air pollution in Jakarta”, *The Economic Record*, Vol. 80, Special Issue September 2004, pp. S65-S75, Economic Society of Australia.
- Rockefeller Foundation (2014), *100 Resilient Cities*, Rockefeller Foundation, New York, available at www.100resilientcities.org.
- Singapore Ministry of the Environment and Water Resources and Ministry of National Development (2009), *A Lively and Liveable Singapore: Strategies for Sustainable Growth, Singapore Sustainable Development Blueprint*, Ministry of the Environment and Water Resources and Ministry of National Development, Republic of Singapore, Kuala Lumpur available at http://app.mewr.gov.sg/data/imgcont/1292/sustainableblueprint_forweb.pdf.
- Singapore National Climate Change Secretariat (2012), *Climate Change and Singapore. Challenges. Opportunities. Partnerships. National Climate Change Strategy 2012: creating a climate for sustainable growth, securing a liveable environment for our future*, National Climate Change Secretariat, Prime Minister’s Office, Republic of Singapore, Kuala Lumpur, available at <http://app.nccs.gov.sg/nccs-2012/docs/NCCS-2012-Publication.pdf?AspxAutoDetectCookieSupport=1>.
- Thailand Ministry of Natural Resources and Environment (2012), *Thailand Climate Change Master Plan 2012-2050*, Office of Climate Change Coordination, the Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment, Bangkok.
- UN DESA (2014a) “File 2: Percentage of Population at Mid-Year Residing in Urban Areas by Major Area, Region and Country, 1950-2050”, *World Urbanization Prospects: The 2014 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.
- UN DESA (2014b) “File 3: Urban Population at Mid-Year by Major Area, Region and Country, 1950-2050”, *World Urbanization Prospects: The 2014 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.
- UN DESA (2012a), “File 17c: Percentage of Urban Population in Cities Classified by Size Class of Urban Settlement, Major Area, Region and Country, 1950-2025”, *World Urbanization Prospects: The 2011 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.
- UN DESA (2012b), “File 17b: Number of Cities Classified by Size Class of Urban Settlement, Major Area, Region and Country, 1950-2025”, *World Urbanization Prospects: The 2011 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.
- UN DESA (2012c), “File 12: Population of Urban Agglomerations with 750,000 Inhabitants or More in 2011, by Country, 1950-2025”, *World Urbanization Prospects: The 2011 Revision*, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.
- UN DESA (2012d), *World Urbanization Prospects: The 2011 Revision*, File 23: Coastal status, Type of drylands ecosystem, Number of multi-Hazards, Risk decile by type of hazard for Urban Agglomerations with 750,000 Inhabitants or More in 2011, CD-ROM Edition, United Nations, Department of Economic and Social Affairs, Population Division, New York.

- UN-Habitat (2010a), *State of the World's Cities 2010/2011 – Cities for All: Bridging the Urban Divide*, UN-Habitat (United Nations Human Settlements Programme), Nairobi.
- UN-Habitat (2010b), *The State of Asian Cities 2010/2011*, UN-Habitat, Fukuoka.
- UNISDR (2012), *A Toolkit for Local Governments: The 10 essentials for making cities resilient*, United Nations International Strategy for Disaster Reduction, Geneva, available at www.unisdr.org/campaign/resilientcities/toolkit/essentials.
- UNISDR (2007), *Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters*, UNISDR, Geneva.
- Viet Nam Government (2012a), *Viet Nam National Green Growth Strategy for the period 2011-2020 with a vision to 2050*, Socialist Republic of Viet Nam, Hanoi, available at www.greengrowth-clearning.org/pdf/VietNam-GreenGrowth-Strategy.pdf.
- Viet Nam Government (2012b), *Viet Nam Sustainable Development Strategy for 2011-2020*, Socialist Republic of Viet Nam, Hanoi.
- Viet Nam Government (2011), *National Strategy on Climate Change*, Socialist Republic of Viet Nam, Hanoi, www.chinhphu.vn/portal/page/portal/English/strategies/strategiesdetails?categoryId=30&articleId=10051283.
- WHO and UNICEF (2014), *Progress on Drinking Water and Sanitation: 2014 update*, World Health Organization, Geneva and UNICEF, New York, www.wssinfo.org/fileadmin/user_upload/resources/JMP_report_2014_webEng.pdf.
- World Bank (2014), “Applying a rapid risk diagnostic approach for building disaster and climate resilience to Indonesia’s growing cities”, *Indonesia Economic Quarterly*, March 2014, World Bank, Jakarta.
- World Bank (2010), *The Economics of Adaptation to Climate Change: Viet Nam*, World Bank Group, Washington, DC.
- World Bank (2008), *Economic Impacts of Sanitation in Southeast Asia: A four-country study conducted in Cambodia, Indonesia, the Philippines and Viet Nam under the Economics of Sanitation Initiative (ESI)*, World Bank, Jakarta.
- Zhu, J. (2010), “Symmetric development of informal settlements and gated communities: capacity of the state – the case of Jakarta, Indonesia”, *ARI Working Paper*, No. 135, February 2010, Asia Research Institute, Singapore, available at www.ari.nus.edu.sg/pub/wps.htm.

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Towards Green Growth in Southeast Asia

Contents

Chapter 1. The case for green growth in Southeast Asia

Chapter 2. Mainstreaming green growth into national development planning

Chapter 3. Founding green growth on sustainable resource use

Chapter 4. National policy options for managing the impact of urbanisation on green growth

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